

TM 3-364

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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

## FLAME THROWER MECHANIZED M 3-4-E6R3



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1945

DEPARTMENT OF THE ARMY

6 JUNE 1945

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*DEPARTMENT OF THE ARMY TECHNICAL MANUAL*  
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**FLAME THROWER  
MECHANIZED  
M 3-4-E6R3**



*DEPARTMENT OF THE ARMY*

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*6 JUNE 1945*

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TM 3-364, Flame Thrower, Mechanized, M3-4-E6R3, is published for the information and guidance of all concerned.

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OFFICIAL:

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Fig. 1. Medium tank with flame thrower M3-4-E6R3 installed.  
E6R3 gun is being fired.

#### **SAFETY PRECAUTIONS**

1. Do not attempt to fire unignited bursts.
2. Do not use oxygen to charge pressure container. Test all cylinders before use to see that they do not contain oxygen.
3. Be sure to release pressure before attempting to remove or disassemble any parts or assemblies which might possibly be under pressure.
4. Do not allow oil, grease, or gasoline (or other combustible solvent) to enter or come in contact with the high pressure system. If it is suspected that any combustible solvent has come in contact with high pressure system, do not attempt to use the flame thrower. Report condition to responsible authority.
5. Be sure that coil end terminal of spark plug cable is firmly seated in the coil receptacle.
6. Make sure that safety knob on gun control assembly is in "safe" position at all times when gun is not being fired.
7. Be sure to depress manual blow-out lever after every burst to release fuel under pressure in gun.

# PART ONE

## INTRODUCTION

---

### Section I. GENERAL.

#### 1. SCOPE.

a. This Technical Manual is published for the information of the using arms and services.

b. In addition to a description of the flame thrower, mechanized, M3-4-E6R3, this manual contains information required for the identification, use, and maintenance of the weapon, ammunition, and accessory equipment.

c. In all cases where the nature of the repair, modification, or adjustment is beyond the scope or facilities of the unit, the responsible Chemical Warfare Service officer should be informed in order that trained personnel with suitable tools and equipment may be provided, or proper instructions issued.

#### 2. RECORDS.

Forms and records applicable for use in performing prescribed operations, and brief explanations of each, are listed below:

a. Record of firing. This form should be improvised by the using arm, and space should be provided for the serial number and number of times the weapon has been fired.

b. War Department lubrication order. LO No. 3-U3 prescribes lubrication maintenance for this flame thrower. A lubrication order is issued with each flame thrower and is to be carried with it at all times.

c. WD AGO Form No. 478, MWO and Major Unit Assembly Replacement Record. This form, carried with the flame thrower, will be used by all personnel completing a modification or major unit assembly replacement. A description of work completed, the date, the number of times the weapon has been fired, and the MWO number or nomenclature of the unit assembly should be clearly recorded. Personnel performing the operation will place their initials in the column provided. Minor repairs, parts, and accessory replacements will not be recorded.

d. WD AGO Form No. 9-81, Exchange Part or Unit Identification Tag. This tag, properly executed, may be used when exchanging unserviceable assemblies, subassemblies, parts, and tools for like serviceable equipment.

e. WD AGO Form No. 468, Unsatisfactory Equipment Report. This form will be used for reporting defects in manufacture, design, or performance, with a view toward improving and correcting such defects.

The form is used also in recommending modifications of materiel. It will not be used for reporting failures, isolated materiel defects, or malfunctions of materiel resulting from fair wear and tear or accidental damage; nor for the replacement, repair, or issue of parts and equipment. It does not replace currently authorized operational or performance records.

f. WD AGO Form No. 6, Duty Roster. This form, slightly modified, is used for scheduling and maintaining a record of flamethrower maintenance operations. It may be used for lubrication records.

## Section II. DESCRIPTION AND DATA.

### 3. GENERAL.

a. Flame thrower. The M3-4-E6R3 mechanized flame thrower (fig. 1) consists of three main groups: the sponson fuel group (tank unit, fuel, mechanized flame thrower, M3, assembly) (fig. 2), the transmis-

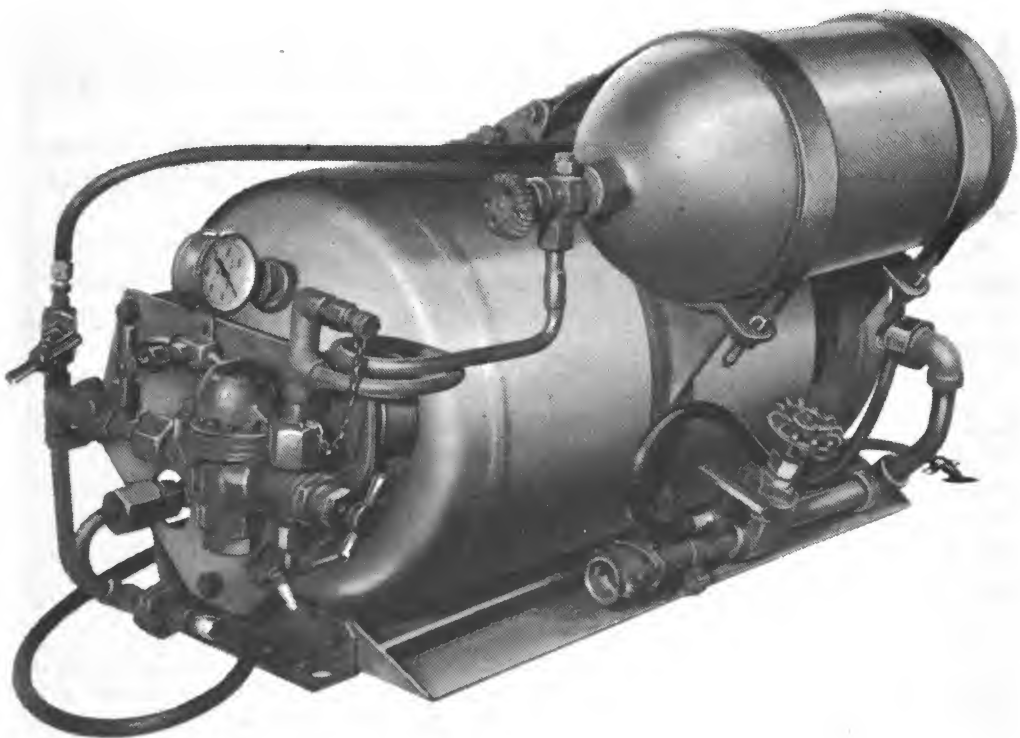


Fig. 2. Sponson fuel group (tank unit, fuel, mechanized flame thrower, M3, assembly).

sion fuel group (tank unit, fuel, mechanized flame thrower, M4, assembly) (fig. 3), and the gun (gun, mechanized flamethrower, E6R3, assembly) (fig. 4) with external wiring. The sponson fuel group is mounted on the sponson shelf directly to the right of the assistant driver. The transmission fuel group is mounted on the transmission case of the vehicle. The gun is mounted in a specially designed periscope holder which may be installed in either the assistant driver's hatch door or in the turret periscope mount.

b. Vehicle. The mechanized flame thrower is installed in medium tanks M4A1 and M4A3 (fig. 5). Installation of the flame thrower does not necessitate removal of other medium tank weapons.

c. Functioning. Fuel is propelled toward the target by means of compressed air. As fuel leaves the gun, it is ignited by an ignition flame which is a comparatively small flame of atomized gasoline, ignited by a spark plug.

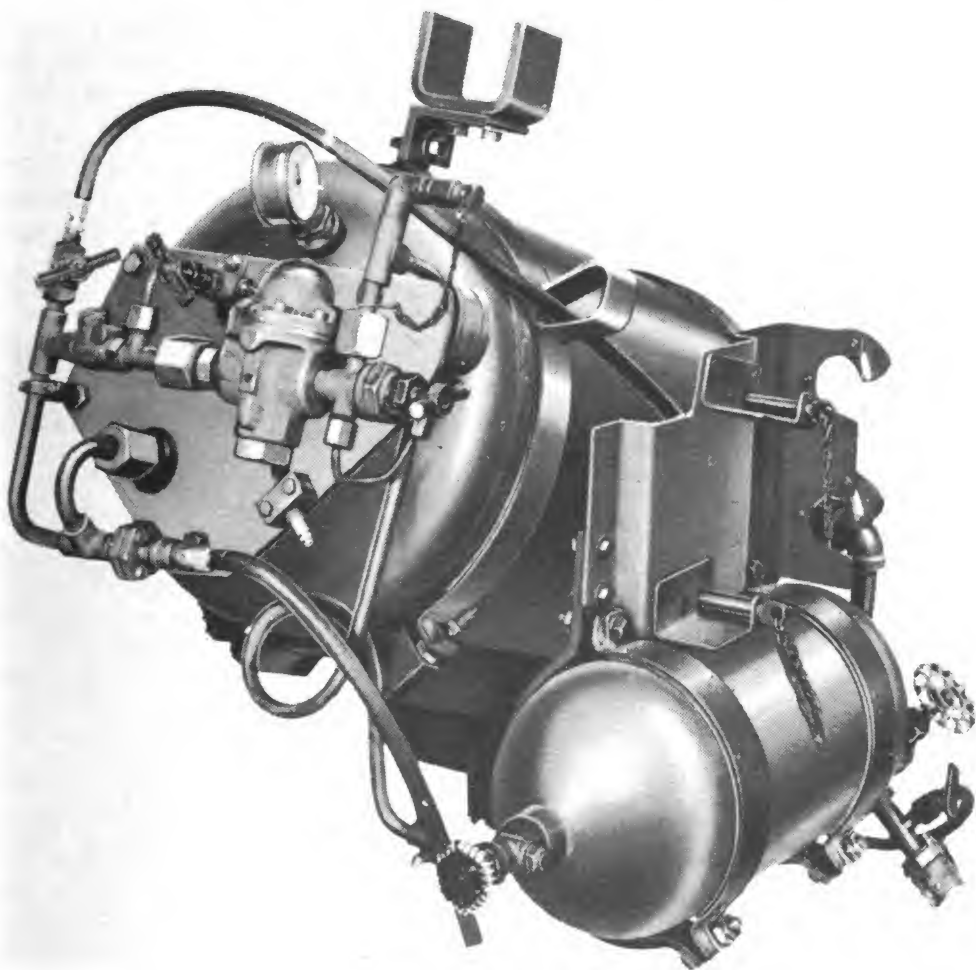


Fig. 3. Transmission fuel group (tank unit, fuel, mechanized flame thrower, M4, assembly).

d. Ranges. (1) Most effective range. When flame thrower is fired point blank, accuracy is assured, and almost all the fuel is effective as little or none is burned while passing through the air to the target.

(2) Other effective ranges. Use of thickened fuel gives a maximum effective range of 40 to 60 yards. Use of liquid fuel gives a maximum effective range of 20 to 30 yards. These distances vary according to thickness of fuel, direction and velocity of wind, and presence of trees or underbrush.

(3) Ineffective range. Burning fuel may travel much farther than ranges given in (2) above, but the fuel is generally ineffective to per-

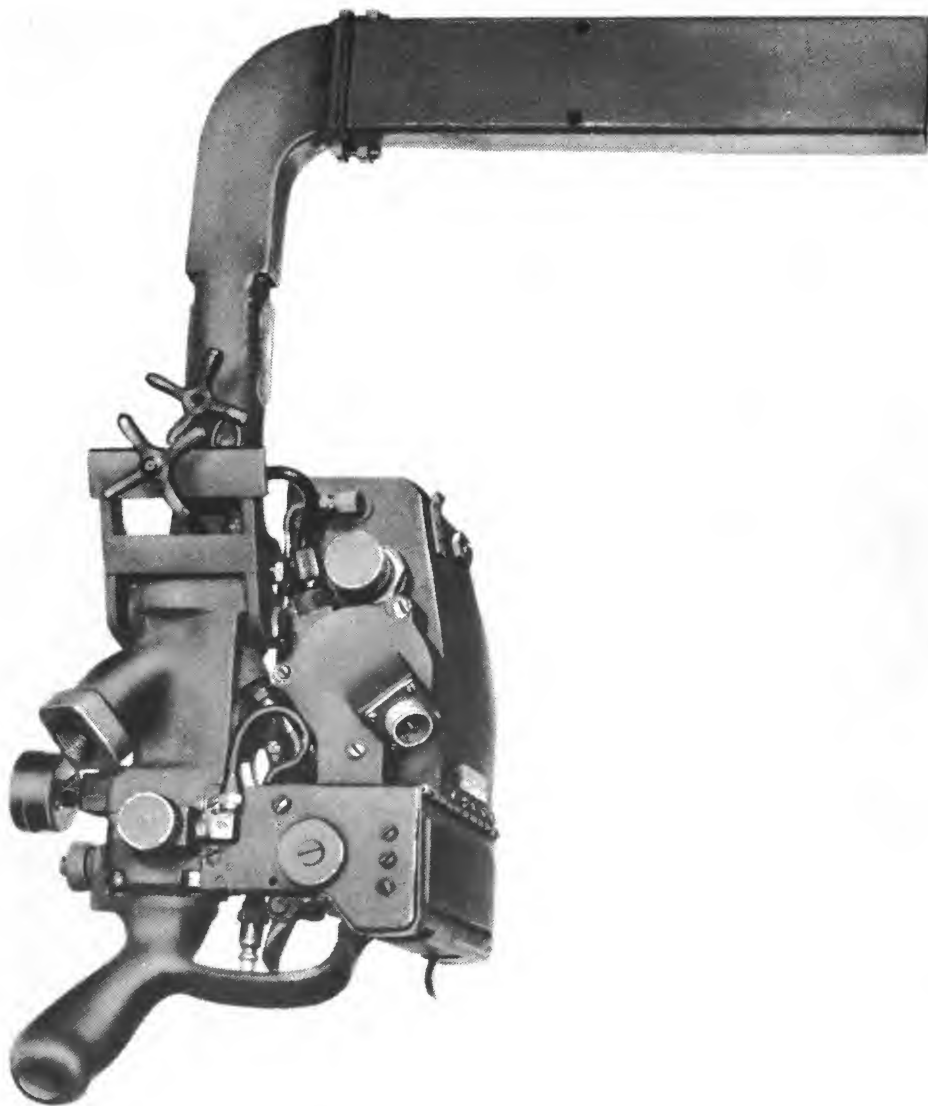


Fig. 4. Gun (gun, mechanized flame thrower, E6R3, assembly).

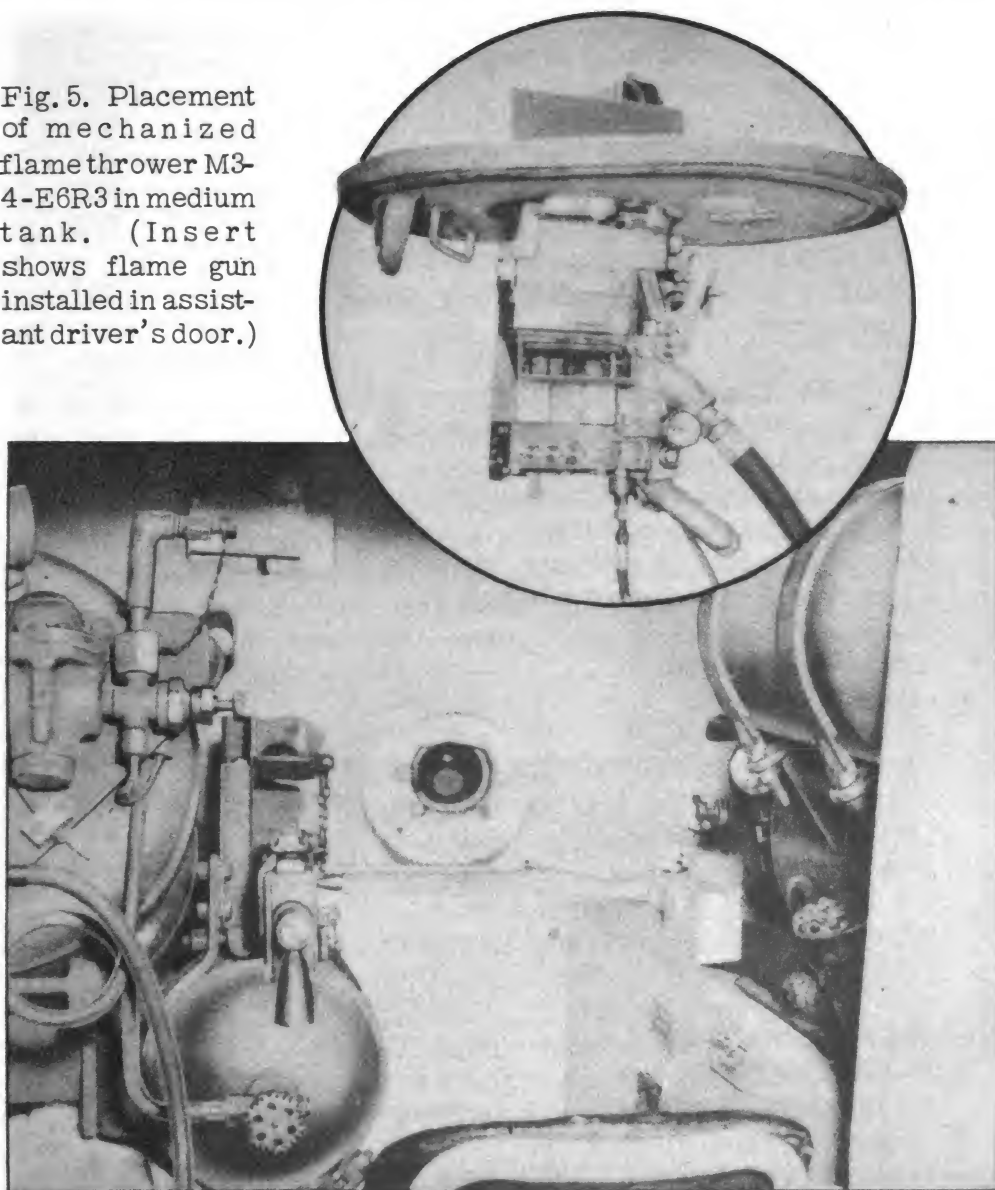
sonnel within pillboxes and nonflammable fortifications, because it lacks force and volume, falls at too steep an angle of descent, and can seldom be aimed accurately.

e. Bursts. Flame throwers are generally fired in short bursts of 2 or more seconds each against one or more specific targets or portions of a target. Keep in mind the limited firing time of the flame thrower. Several short bursts are usually more effective than one continuous longer burst.

#### 4. IDENTIFICATION INFORMATION.

Three serial, model, and lot numbers are required for records concerning the components of M3-4-E6R3 mechanized flame thrower

Fig.5. Placement of mechanized flamethrower M3-4-E6R3 in medium tank. (Insert shows flame gun installed in assistant driver's door.)





materiel. They are the numbers of the sponson fuel group (M3), the transmission fuel group (M4), and the gun (E6R3).

a. Sponson fuel group. A name plate, showing identification information, is fastened to the pressure line plate.

b. Transmission fuel group. A name plate, showing identification information, is fastened to the pressure line plate.

c. Gun. Identification information appears on a name plate fastened to the front of the gun housing.

## 5. TABULATED DATA.

All data are approximate.

### a. Weights.

	<u>Pounds</u>
Flame gun (without external wiring) . . . . .	28
Flame gun (with external wiring) . . . . .	33
Sponson fuel group (empty) . . . . .	295
Sponson fuel group (filled with fuel) . . . . .	455
Transmission fuel group (empty) . . . . .	365
Transmission fuel group (filled with fuel) . . . . .	525
M3-4-E6R3 mechanized flame thrower (empty) . . .	693
M3-4-E6R3 mechanized flame thrower (filled with fuel) . . . . .	1,013

### b. Dimensions.

	<u>Inches</u>
Baseplate of sponson fuel group . . . . .	16 by 33
Maximum height of sponson fuel group . . . . .	22-1/2
Length of fuel container . . . . .	31-1/2
Outside diameter of fuel container . . . . .	16-3/4
Length of pressure container . . . . .	23
Outside diameter of pressure container . . . . .	9-5/8
Flame gun length (less gun hose) . . . . .	23
Gun hose length . . . . .	66
Flame shield length . . . . .	11-1/2

### c. Capacity.

#### (1) Fuel.

Fuel containers (transmission and sponson groups) . . . . . 25 gallons each

#### (2) Gasoline.

Gasoline reservoir . . . . . 1-1/4 pint

#### (3) Electricity (low tension).

Ignition system . . . . . 12 volts

#### (4) Pressure.

	<u>Pounds per square inch</u>
Pressure container . . . . .	1,800 to 2,100
Fuel container . . . . .	370 to 380
Ignition gasoline reservoir . . . . .	15 to 30

### d. Performance.

Range (maximum) using liquid fuel . . . . . 20 to 30 yards

Range (maximum) using thickened fuel . . . .	40 to 60 yards
Elevation (maximum) . . . . .	24 degrees
Depression (maximum) . . . . .	20 degrees
Right traverse (from assistant driver's door) (maximum) . . . . .	90 degrees
Left traverse (from assistant driver's door) (maximum) . . . . .	45 degrees
Bursts (continuous stream from <u>each</u> fuel container)	
5/16-inch nozzle . . . . .	35 seconds
3/8-inch nozzle . . . . .	25 seconds
7/16-inch nozzle . . . . .	20 seconds
Rate of fire (per second)	
5/16-inch nozzle . . . . .	7/10 gallon
3/8-inch nozzle . . . . .	1 gallon
7/16-inch nozzle . . . . .	1-1/5 gallons

### Section III. TOOLS, PARTS, AND ACCESSORIES.

#### 6. ORGANIZATIONAL SPARE PARTS.

A set of organizational spare parts is supplied to the using arm for field replacement of those parts most likely to become broken, worn, or otherwise unserviceable. The sets should be kept complete by requisitioning new parts for those used. The parts comprising the set are listed below. Spare parts provided with each flame thrower are listed only; this list will not be used in requisitioning. The authority upon which requisitions are based is Army Service Forces Catalog CW 7-440321 (to be printed).

<u>Quantity</u>	<u>Nomenclature</u>
1	ATOMIZER, assembly
1	BARREL, gun, assembly
12	DIAPHRAGM, safety head, 1/2"
2	ELECTRODE, ground
1	FILTER, gasoline reservoir
5	FUSE, glass tube, 6 amp.
3	GASKET, barrel coupling
6	GASKET, flame shield
3	GASKET, gasoline, distributor plate
1	GASKET, filter, gasoline reservoir
3	GASKET, discharge valve, lower
3	GASKET, discharge valve, upper

3	GASKET, valve block
1	NOZZLE, fuel, 5/16"
1	NOZZLE, fuel, 7/16"
8	NUT, lock, S., stainless 1/4" - 20NC (for gasoline housing studs)
12	NUT, mach. screw, hex., S., (cadmium plated) No. 8-32NC (for coil cap studs)
4	PACKING, O-ring, 3/8" I. D. x 9/16" O. D. x 3/32" thick (for discharge valve plunger, atomizer, and clean-out valves)
1	PACKING, O-ring, 1-1/8" O. D. x 7/8" I. D. x 1/8" thick (for plunger piston)
1	PERISCOPE
6	PIN, eyebolt release
6	SCREW, cap, socket head, S., (cadmium plated) No. 10-32NC x 3/4" (for flame shield)
4	SCREW, set, socket head, cup pt., S., (phosphate coating) No. 8-32NC x 1/4" (for atomizer attachment)
2	SPARK PLUG, ignition, assembly (with front and rear gaskets and terminal stud)
6	STUD, coil cap (slotted)
1	SWITCH, ignition, assembly
2	SPRING, valve (for atomizer and clean-out valve)
2	VALVE, atomizer and clean-out, gun, assembly
5	WASHER, union, 1/4" (synthetic rubber)
6	WASHER, union, 3/8" (synthetic rubber)
6	WASHER, union, 1/4" O. D. tubing (synthetic rubber)
2	WASHER, coupling
12	WASHER, lock, reg., S., (cadmium plated) No. 8 (for coil cap studs)
8	WASHER, plain, SAE std., S., (cadmium plated), 1/4" (for gasoline housing studs)

## 7. TOOLS AND SPARE PARTS.

a. General. Tools include equipment required for cleaning and preservation of the flame thrower and for such assembling and disassembling as the using arm is authorized to perform. Spare parts furnished are those required for first echelon maintenance. Tools and spare parts should not be used for purposes other than those prescribed and should be properly stored when not in use. Those tools and accessories issued for organizational maintenance are listed in section XII. The tools and spare parts listed in b and c below are to be kept in the vehicle at all times for first echelon maintenance of the M3-4-E6R3 flame thrower. If it becomes necessary to replace a broken, missing,

or worn spare part or accessory, this list should be checked with Army Service Forces Catalog CW 7-440321 (to be printed), which is the authority for requisitioning.

b. Tools.

<u>Quantity</u>	<u>Nomenclature</u>
2	WRENCH, socket head screw (5/32") for No. 10 socket head cap screw (to be used for removing flame shield)

c. Spare parts.

<u>Quantity</u>	<u>Nomenclature</u>
1	BARREL, gun, assembly
1	GASKET, barrel coupling
1	GASKET, flame shield
4	SCREW, cap, socket hd., S., (cadmium plated) No. 10-32NC x 3/4"

NOTE: Tools and spare parts listed above may or may not be packed in the gun box.

## PART TWO

# OPERATING INSTRUCTIONS

---

### Section IV. GENERAL.

#### 8. SCOPE.

Part two contains information for the guidance of the personnel responsible for the operation of this equipment. It contains information on the operation of the equipment with the description and location of controls and instruments.

### Section V. SERVICE UPON RECEIPT OF EQUIPMENT.

#### 9. GENERAL.

a. Upon receipt of new or used materiel, it is the responsibility of the officer in charge to ascertain that it is complete and in sound oper-

ating condition. A record should be made of missing parts or of malfunctions. Such conditions should be corrected as quickly as possible.

b. Attention should be given to small and minor parts, as these are likely to become lost and may seriously affect the proper functioning of the materiel.

c. The materiel should be cleaned and prepared for service in accordance with instructions given in paragraphs 11 through 23. The materiel should be lubricated in accordance with section XIII.

#### **10. TOOLS AND EQUIPMENT NEEDED FOR INSTALLATION.**

The following tools and equipment are required to prepare the weapon for installation and to install it in medium tanks M4A1 and M4A3:

Portable welding and cutting apparatus

14-inch pipe wrench

15-inch adjustable end wrench

8-inch adjustable end wrench

4-inch adjustable end wrench

Large screw driver (10-inch blade)

Medium screw driver (6-inch blade)

Small screw driver (4-inch blade)

Offset screw driver

Center punch

Ball peen hammer

Cold chisel

Pair of pliers

1/2-inch rope, 15 feet in length (chain or cable may be used instead)

#### **11. PREPARATION OF VEHICLE FOR INSTALLATION.**

a. To install the sponson fuel group, remove ammunition racks, ammunition, and spare parts box from sponson shelf on right of assistant driver by unbolting or using cutting torch. Sponson shelf should be flat and smooth to receive baseplate of sponson fuel group (fig. 6).

b. For installation of transmission fuel group, remove ventilator fan, chart table, compass, and other accessories located over transmission case of vehicle. Place these items in another appropriate space. On some vehicles, it may be necessary to remove racks containing spare periscopes and carrier which holds cal. .30 ammunition box. After installation of baseplate of transmission fuel group, relocate carrier on hull to left of ball mount.

c. On medium tank M4A3, a portable 4-pound fire extinguisher is located in front of assistant driver's seat. Remove the extinguisher and the bracket; relocate in a convenient place.

#### **12. PREPARATION OF SPONSON FUEL GROUP FOR INSTALLATION.**

Perform the following steps to prepare the sponson fuel group for installation in the vehicle:



Fig. 6. Right sponson shelf after clearing and prior to installation of fuel group.

a. Dismantle packing box. (1) Remove packing box lid and lift out the boxes containing gun, tools, organizational spare parts, and pressure container relocating equipment.

(2) Knock out sides and ends of packing box. Do not remove fuel group from bottom of box (fig. 7).

(3) Place box lid (inner side up) on the ground near bottom of box.

(4) Lay all parts and assemblies on the box lid as they are removed from the sponson fuel group.

(5) Remove rust-preventive materials from sponson fuel group.

b. Disassemble parts and assemblies from sponson fuel group. On vehicles with a single turret hatch without the vision cupola, it is necessary to remove only the pressure container, pressure container straps, discharge hose, and bleed hose before installation in the vehicle. On all other models, follow complete procedure below:

(1) Loosen nut which connects pressure container to loop (fig. 7).

(2) Loosen nut connecting loop to pressure cut-off valve.

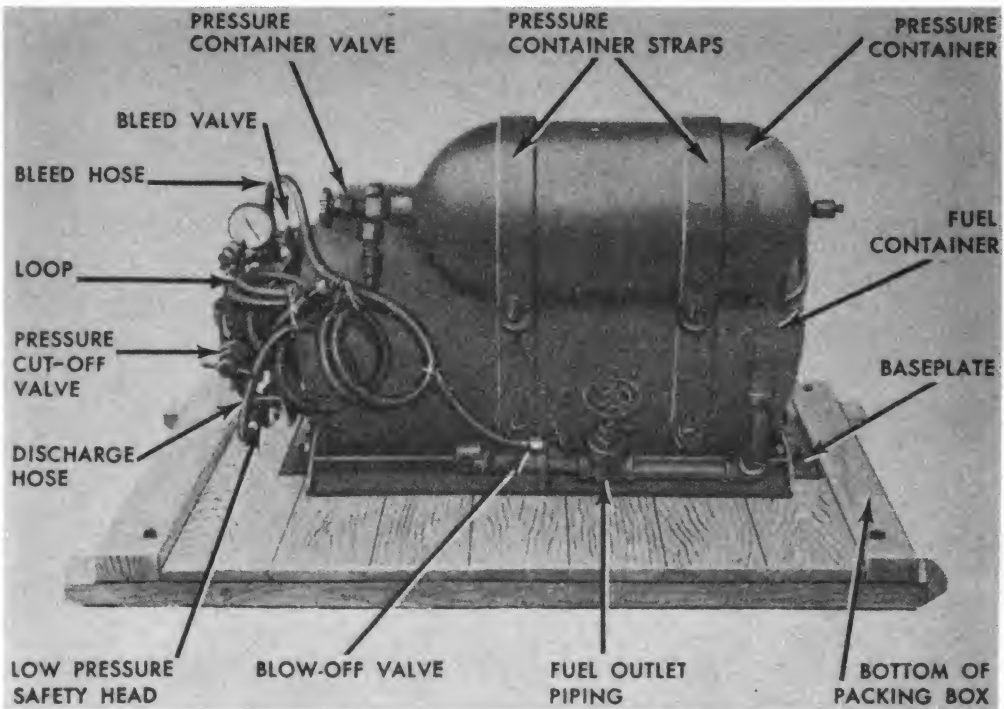


Fig. 7. Sponson fuel group ready for disassembly prior to installation.

(3) Remove the jam nut and the nut from each pressure container strap. Do not push bolts entirely out of holes.

(4) Attach thread protector cap (fig. 8) to pressure container valve outlet.

(5) Remove pressure container (fig. 9) from pressure container straps by sliding toward pressure line plate.

(6) Loosen hex nut which connects pressure line to fuel container.

(7) Disconnect bleed hose union at bleed valve, using a wrench on hex nut of union.

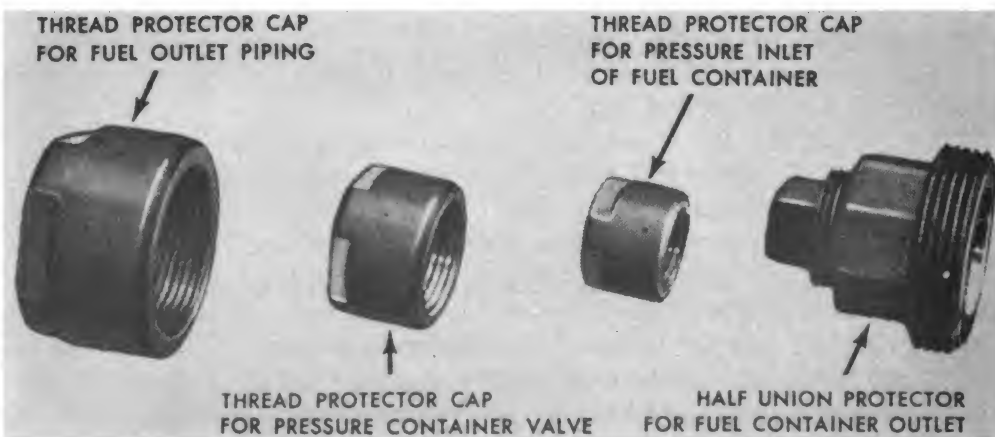


Fig. 8. Thread protector caps and half union protector.



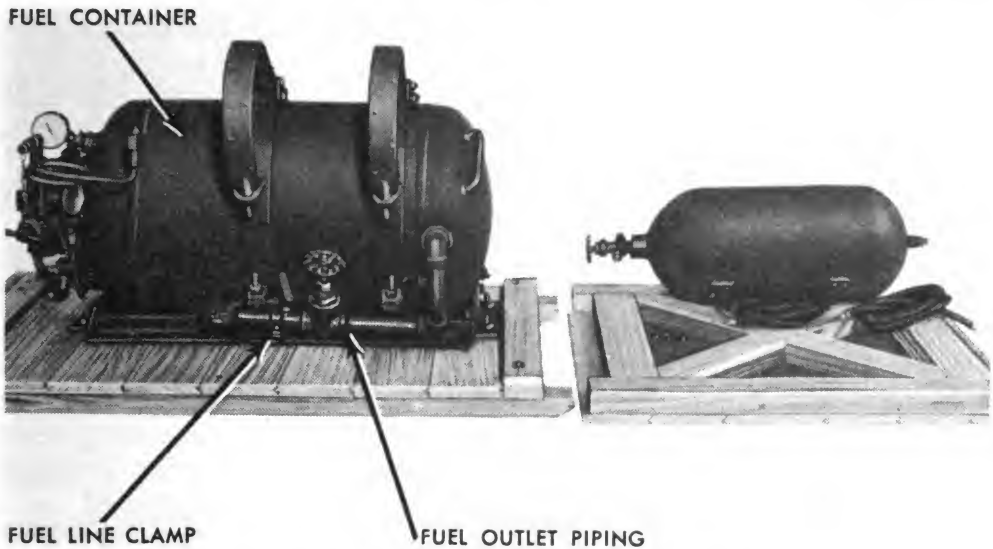


Fig. 9. Pressure container removed from fuel container.

(8) Disconnect discharge hose from safety head by applying wrench to hex nut of union.

(9) A synthetic rubber washer separates the two metal surfaces in seat of union between fuel container and pressure line. Make certain this washer is present. Using wrench, remove the three stud bolts and the lock washers which hold pressure line plate to fuel container. Remove pressure line plate (fig. 10). With synthetic rubber washer in position, screw thread protector cap (fig. 8) on pressure inlet threads of fuel container.

(10) Remove fuel line clamp from fuel outlet piping by unscrewing two screws with screw driver.

(11) Using two wrenches, hold the back wrench steady and pull front wrench clockwise to loosen hex nut on union between fuel container and fuel outlet piping. Attach thread protector to outlet pipe (fig. 8). At-

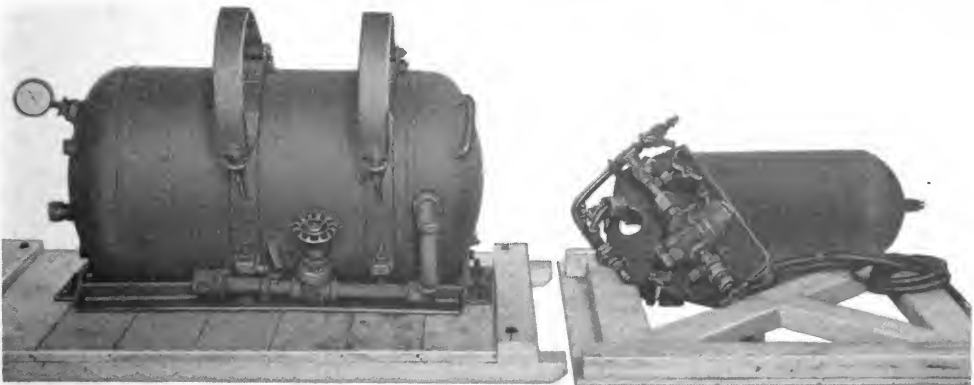


Fig. 10. Pressure container, loop, pressure line plate, bleed hose, and discharge hose removed from sponson fuel group.

tach half union protector to fuel outlet (fig. 8). Tighten union nut to protect seat of union.

(12) Remove the jam nut and the nut from the two front fuel container straps.

(13) Remove the four nuts and the two bolts which connect link to the two back fuel container straps. Do not disconnect other bolts on link.

(14) Lift off front fuel container straps and pressure container straps as units (fig. 11). Do not disassemble them.

(15) Remove the low pressure gage from fuel container.

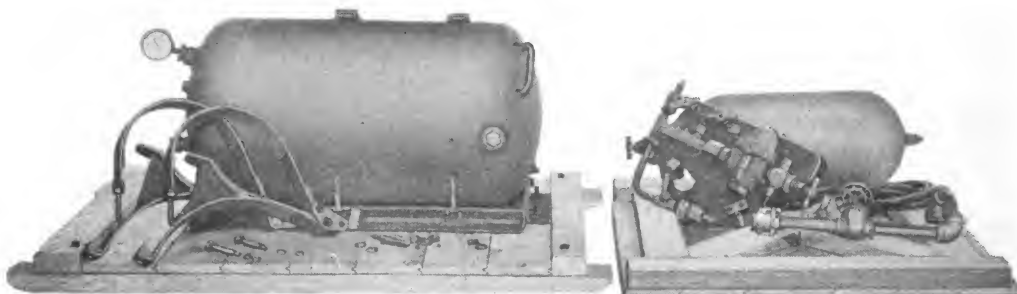


Fig. 11. Front fuel container straps and pressure container straps removed from sponson fuel group.

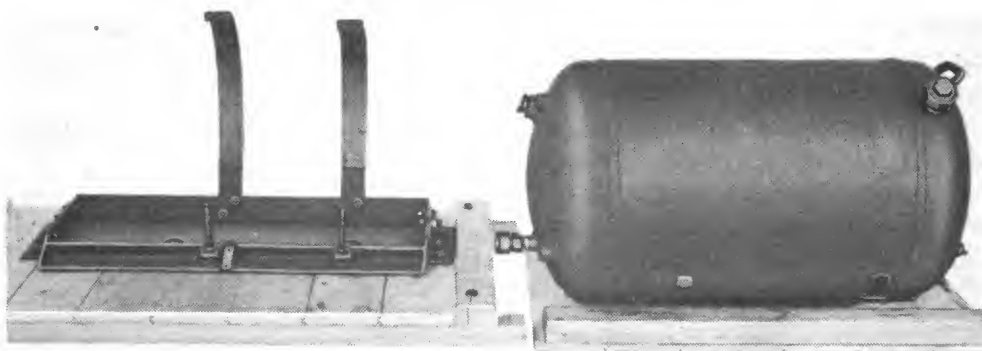


Fig. 12. Fuel container removed, showing back fuel container straps on baseplate of sponson fuel group.

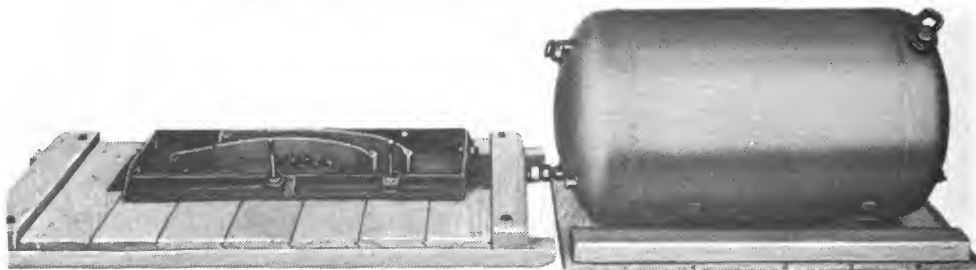


Fig. 13. Sponson fuel group disassembled and ready for installation.

(16) Lift out fuel container (fig. 12).

(17) Remove the four nuts, bolts, and lock washers which connect back fuel container straps to baseplate and lift off back fuel container straps (fig. 13).

(18) Remove the two bolts at each end of base bracket. Lift baseplate from bottom of packing box.

### 13. MOUNTING OF SPONSON FUEL GROUP.

Four men are required to mount and install the sponson fuel group. One man sits in assistant driver's seat, one stays in turret until fuel container is passed through turret, and two men work outside the vehicle. To provide unobstructed views of the operations, figures in this section show mounting on a mock-up sponson shelf. Four men work together to perform the following installations:

a. Baseplate (fig. 14). (1) On some models of medium tanks, lift

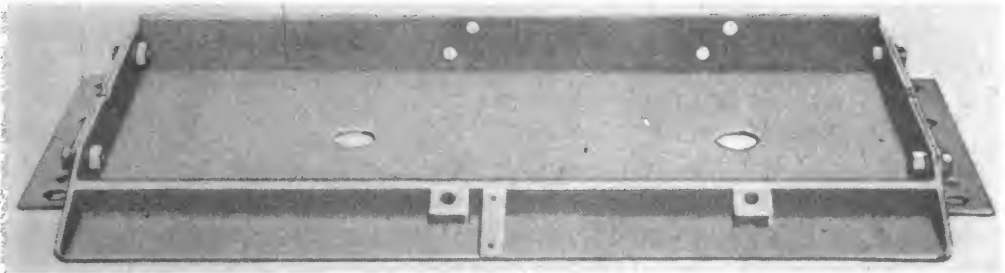


Fig. 14. Baseplate in position on mock-up sponson shelf.

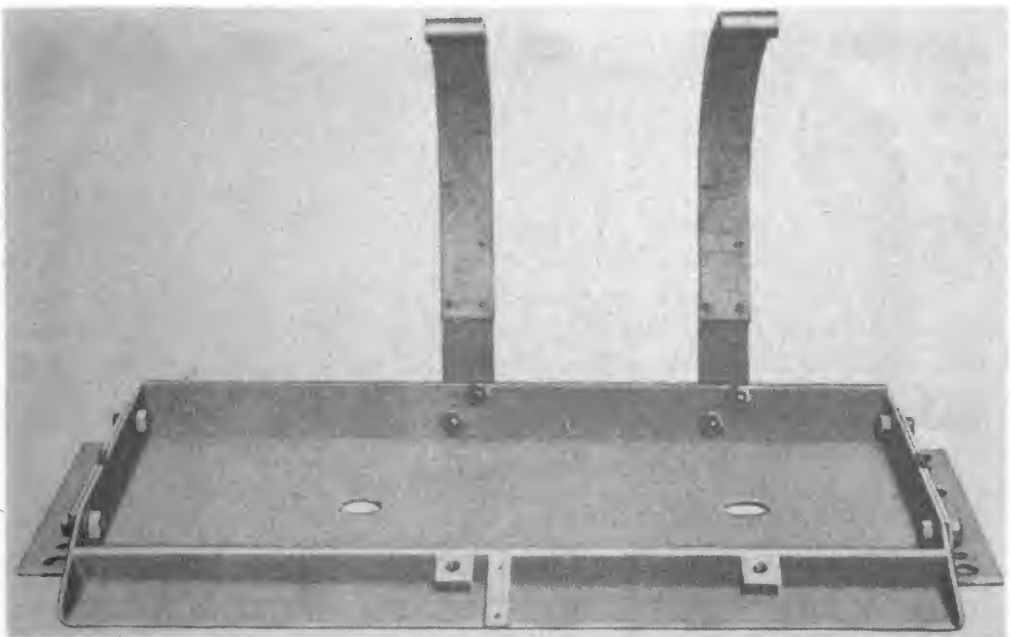


Fig. 15. Back fuel container straps bolted on baseplate of sponson fuel group.

baseplate, with base brackets attached, through assistant driver's hatch. On other models of medium tanks, lift baseplate and brackets through turret hatch. On all models, rotate turret so opening in turret basket is directly behind assistant driver's seat.

(2) Slide baseplate and brackets onto right sponson shelf, at right of assistant driver's position. Remove the two stud bolts from front of baseplate. The baseplate must be alined with vertical side wall of vehicle. Do not weld or bolt baseplate to sponson shelf at this time.

**b. Back fuel container straps.** (1) Place the two back fuel container straps in position.

(2) Secure straps by two bolts, two lock washers, and two nuts (fig. 15).

**c. Fuel container.** (1) Attach rope to handle of fuel container and hoist the container to top of turret. Use care to protect fuel container outlet and pressure inlet to fuel container.

(2) With one man in turret to receive fuel container, place fuel container on floor of turret. Remove rope.

(3) Slide fuel container to opening in turret basket, in back of assistant driver's seat. Pass container to man in assistant driver's compartment, who, in turn, slides container onto baseplate (fig. 16).

(4) Drop the two circular metal pads on bottom of fuel container into two locating holes in baseplate. The fuel container is now located so that pressure line plate is forward and fuel container outlet is at rear and right of assistant driver's seat. Move fuel group as necessary on sponson shelf to facilitate installation.

(5) Install the two stud bolts in front of the baseplate.

**d. Front fuel container straps and pressure container straps** (fig. 17).

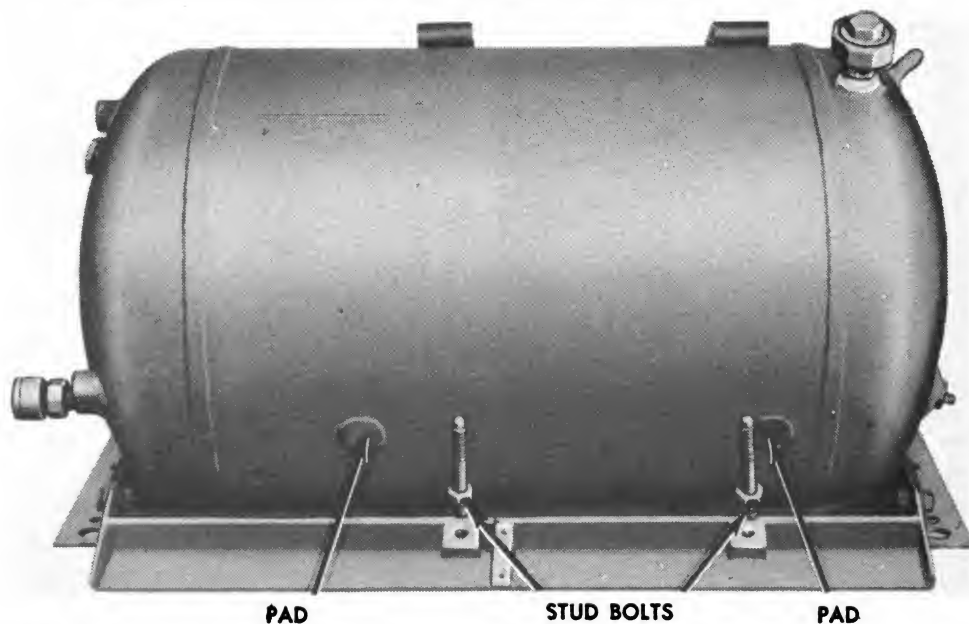


Fig. 16. Fuel container of sponson fuel group on baseplate, prior to positioning fuel container and stud bolts.

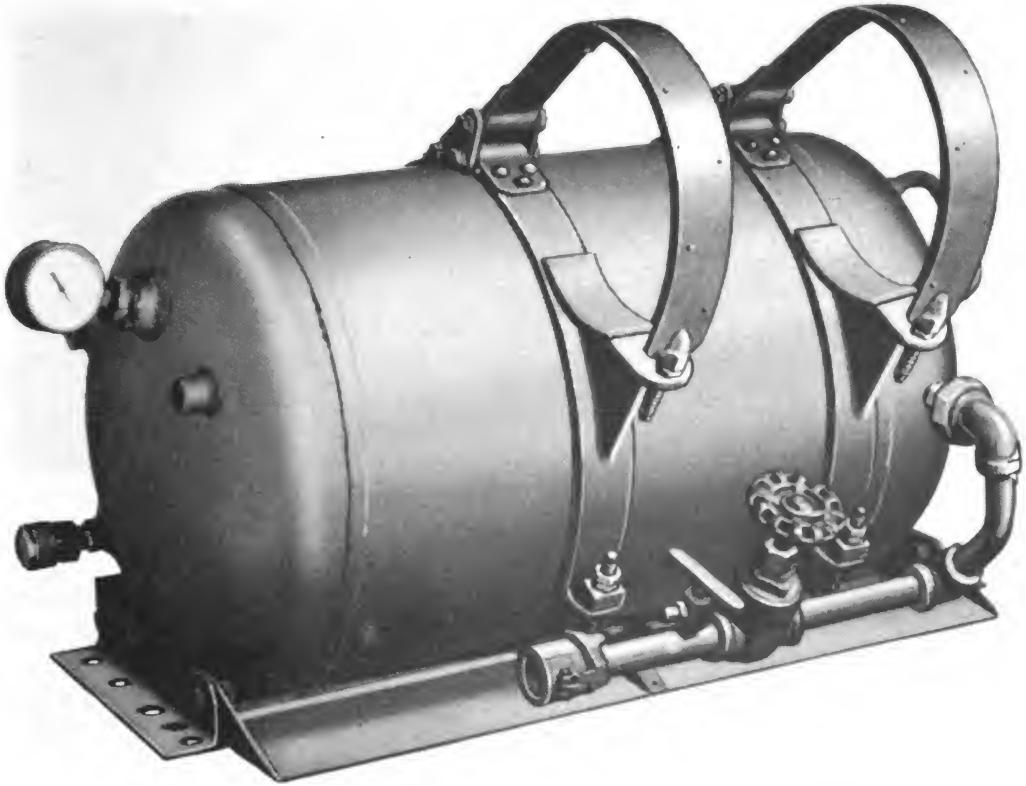


Fig. 17. Straps tightened on fuel container of sponson fuel group. Pressure container straps are not yet tightened. Fuel outlet piping is installed.

(1) Pass assembled front fuel container straps, pressure container straps, links, two link bolts, nuts, and washers through assistant driver's door.

(2) Place front fuel container straps over fuel container and engage holes in straps over two stud bolts.

(3) Secure links to back fuel container straps by inserting bolts through each link and each back strap. Tighten in place by means of two nuts on each bolt.

(4) Secure two front fuel container straps and the fuel container to baseplate by means of two nuts. Tighten each nut with wrench until straps are in firm contact with fuel container throughout their lengths. Use second nuts as lock nuts.

(5) Install low pressure gage on fuel container.

e. Fuel outlet piping. (1) Pass fuel outlet piping, fuel line clamp, clamp fillers (shims), and fuel line clamp screws through assistant driver's door. Then remove thread protector cap from fuel outlet piping.

(2) Remove half union protector from fuel container outlet.

(3) Aline fuel outlet piping with fuel line clamp and with fuel outlet from fuel container. Loosely connect coupling nut of piping to male threaded connection at rear of fuel container.

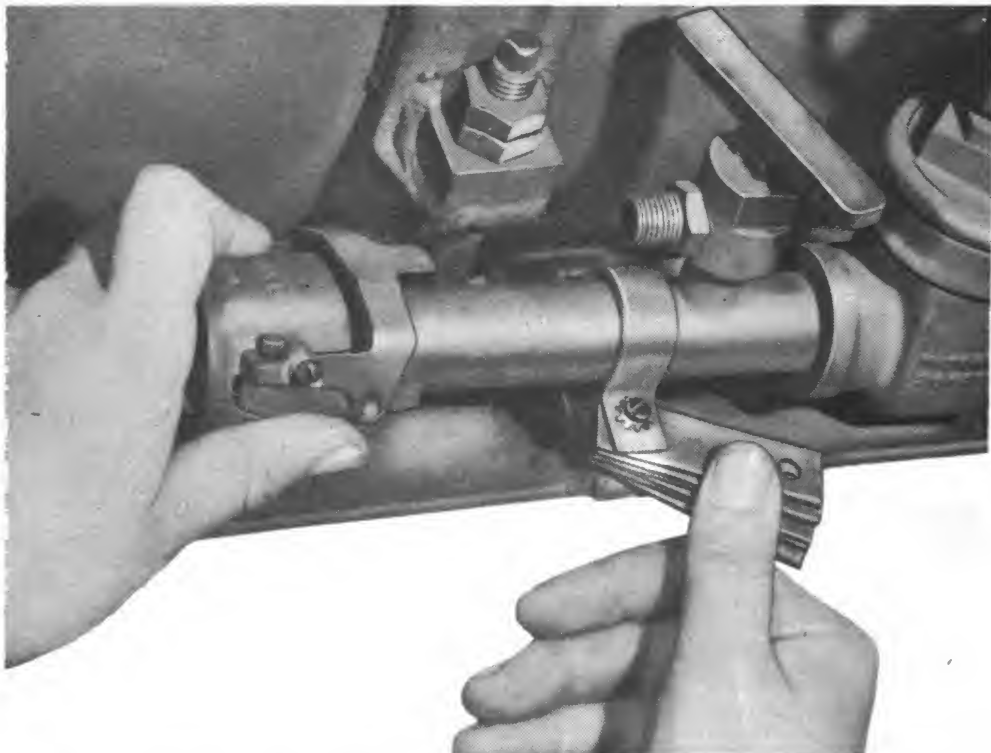


Fig. 18. Clamp fillers being moved into position under fuel line. Clamp is in position on fuel outlet piping of sponson fuel group.

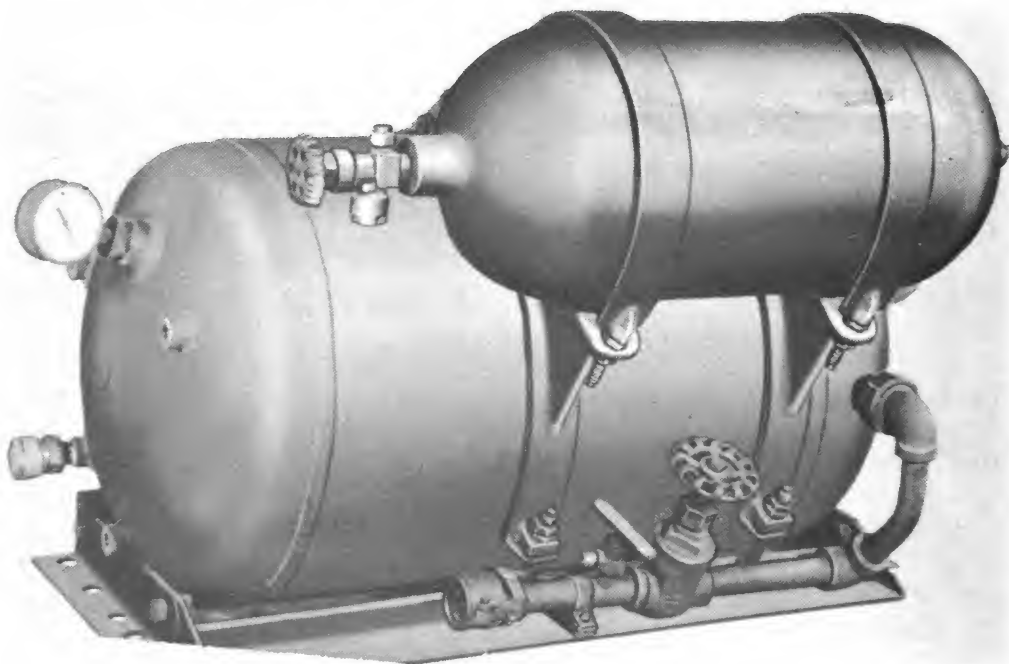


Fig. 19. Pressure container held in place by pressure container straps.



(4) Place fuel line clamp over piping. Place clamp fillers (shims) under piping, alining holes in fillers with those in base bracket. Secure clamp to base bracket by passing two screws through clamp and fillers to the base bracket. By placing front screw through clamp and fillers first (fig. 18), fillers may be readily moved into position for back screw. Tighten with screw driver.

(5) Tighten union nut at fuel container outlet with two wrenches. Figure 17 shows fuel outlet piping installed.

f. Pressure container. (1) Pass pressure container through assistant driver's door. Slide pressure container through the two pressure container straps. To ease this operation, fuel group may be shifted on sponson shelf to obtain clearance. Do not secure pressure container at this time; allow it to rest in straps (fig. 19). Remove thread protector cap.

(2) Turn fuel group so that its front end extends slightly over edge of sponson shelf.

g. Pressure line plate. (1) Pass pressure line plate, three stud bolts, three washers, loop, and synthetic rubber washer through assistant driver's door.

(2) Remove thread protector cap from pressure inlet of fuel container, making sure synthetic rubber washer is in recessed portion of pressure inlet union of fuel container (fig. 20).

(3) Insert three stud bolts and three washers in pressure line plate. Aline bolts with three tapped (internal threaded) bosses of fuel container. At the same time, aline pressure inlet union and its washer with coupling on fuel container. Screw all three stud bolts and pressure inlet union nut handtight. Uniformly tighten the three stud bolts, so



Fig. 20. Placing synthetic rubber washer in recess of fuel container pressure inlet union.



that mounting plate is firmly in contact with the three bosses of the fuel container (fig. 21). Tighten union nut on pressure inlet connection between pressure line plate and fuel container.

h. Loop. (1) Attach loop to union on top of pressure cut-off valve. Be sure synthetic rubber washer is in the recess. Make union nut hand-tight only.

(2) Remove thread protector cap from pressure container valve.

(3) Slide pressure container forward or backward and rotate it until male connection on loop centers with recess of pressure container valve.

(4) Carefully screw loop nut on valve thread (fig. 22). Because threads are fine and easily damaged, care must be taken so that the nut screws on freely and does not require forcing. Do not tighten with wrench until next step is completed.

(5) Tighten the two pressure container straps by screwing the four nuts tightly on the two studs on the straps. Tighten nuts until pressure container straps are firm and flat against pressure container.

(6) Using wrench, tighten coupling nut which connects loop to pressure container valve.

(7) Tighten, with a wrench, the large hex nut which connects loop to pressure cut-off valve.

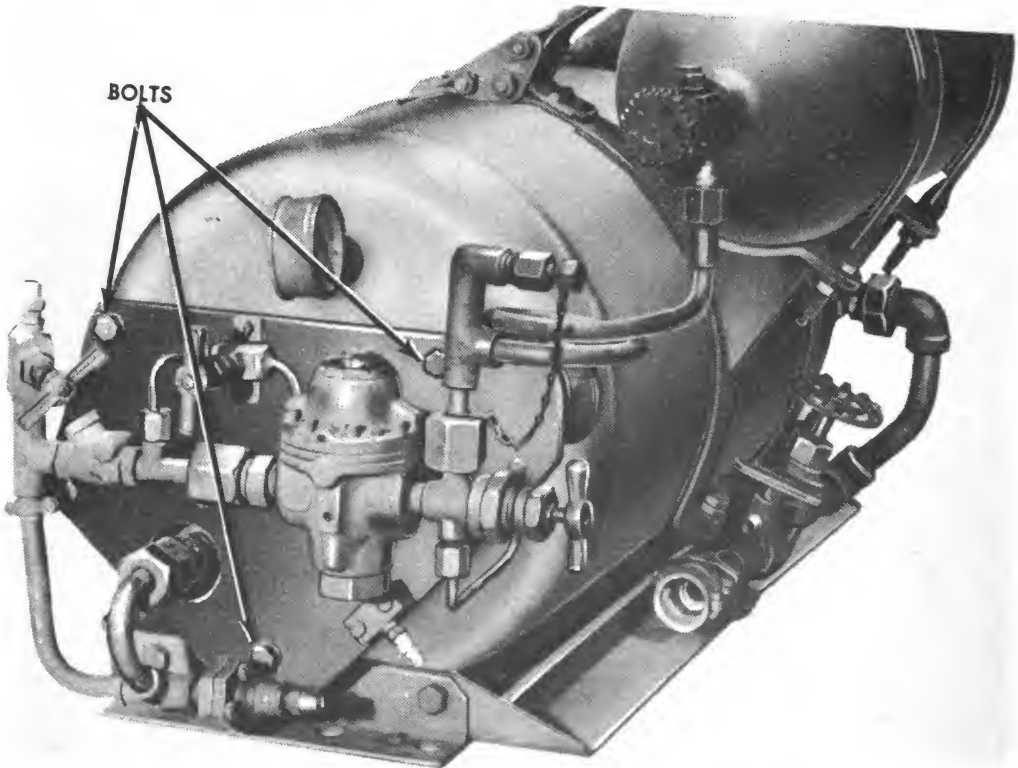


Fig. 21. Pressure line plate bolted on three bosses of fuel container of sponson fuel group.



Fig. 22. Screwing loop to pressure container valve. Exercise special care not to force and damage the fine threads.

i. Discharge hose. (1) Pass discharge hose through assistant driver's hatch. Screw coupling end of hose to male connection on safety head.

(2) Pass discharge hose around back of sponson fuel group and allow free end of hose to extend beyond rear of fuel container. It is desirable to secure discharge hose to back straps of fuel container, using heavy cord or covered wire. Be sure a loop at least 6 inches in diameter is allowed for slack at safety head.

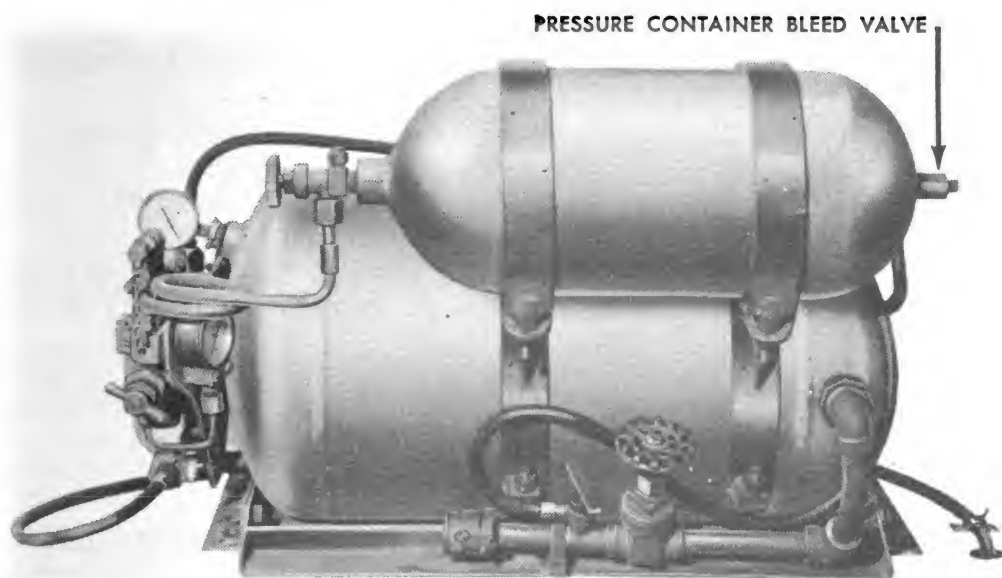


Fig. 23. Sponson fuel group completely assembled.

j. Bleed hose. Attach bleed hose coupling to male connection on top of bleed valve. Other end of bleed hose should be connected to blow-off valve. Tighten with wrench. Fuel and pressure group is now completely assembled (fig. 23).

#### **14. SECURING SPONSON FUEL GROUP TO SPONSON SHELF.**

After mounting as described in paragraph 13 has been completed, the fuel group may be secured to sponson shelf by either of the following methods:

a. Using bolts. (1) Slide fuel group against side wall of vehicle, so that rear of base is flush with side wall of vehicle.

(2) Slide fuel group backward on sponson shelf until pressure container touches padding over and in back of assistant driver's position.

(3) Locate position where the four holes are to be drilled through sponson shelf to hold baseplate to sponson shelf. Use center punch to mark location of holes.

(4) Slide fuel group forward and drill two back holes for 1/2-inch bolts. Slide fuel group backward and sidewise. Drill two front holes.

(5) Slide fuel group so that the four holes in sponson shelf and base bracket are alined.

(6) Insert in these holes the four 1/2-inch bolts which come in a cloth bag tied to a brace in sponson fuel group packing box. A man on outside of vehicle applies a nut and lock washer to each of the four bolts. He tightens the nuts while the man inside the vehicle holds them with a wrench.

b. Tack welding. Secure fuel group to sponson shelf by tack welding the base bracket to sponson shelf. Tack welds may be made around large holes in the bracket.

#### **15. SECURING FREE END OF DISCHARGE HOSE OF SPONSON FUEL GROUP TO SPONSON SHELF OF VEHICLE.**

a. Drill or burn a hole in sponson shelf 6 inches to rear of base bracket and as near as practicable to side wall of vehicle.

b. Pass discharge hose through this hole in sponson shelf. Allow hose to protrude 2 inches outside of vehicle.

c. Make an improvised clamp to hold inside portion of hose in place on the shelf. Bolt or tack weld clamp to shelf approximately 2 inches from the hole. Wire the hose to the clamp (fig. 23).

d. Coil excess discharge hose to form a loop. Secure this loop to one of the back fuel container straps with cord, tape, or covered wire. Be sure hose is not kinked.

#### **16. RELOCATING PRESSURE CONTAINER.**

On some M4 series medium tanks the pressure container of the sponson fuel group interferes with the traverse of the flame gun. In this case, the pressure container may be removed together with the two pressure container straps and relocated on the sponson shelf, in front of the fuel container (fig. 24). A high pressure line (loop) and two saddle brackets

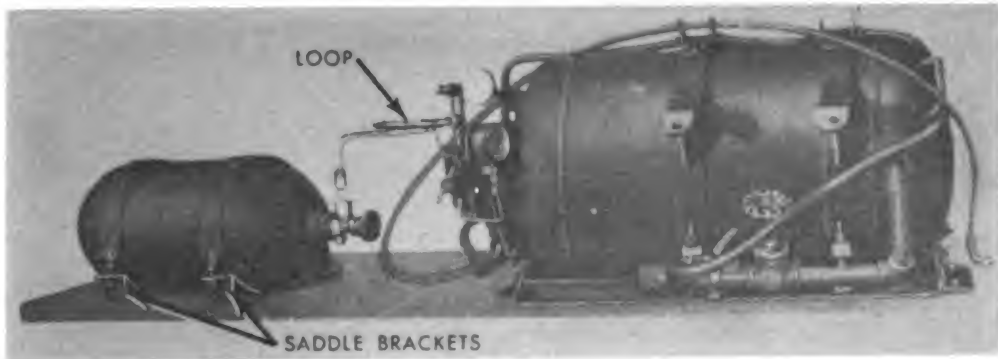


Fig. 24. Pressure container relocated on sponson shelf.

are provided for the relocation of the pressure container. To relocate pressure container proceed as follows:

- a. Remove loop from pressure container valve and pressure cut-off valve.
- b. Remove pressure container and pressure container straps from fuel container straps.
- c. Lay saddle brackets on sponson shelf in front of fuel container.
- d. Lay pressure container in saddle brackets.

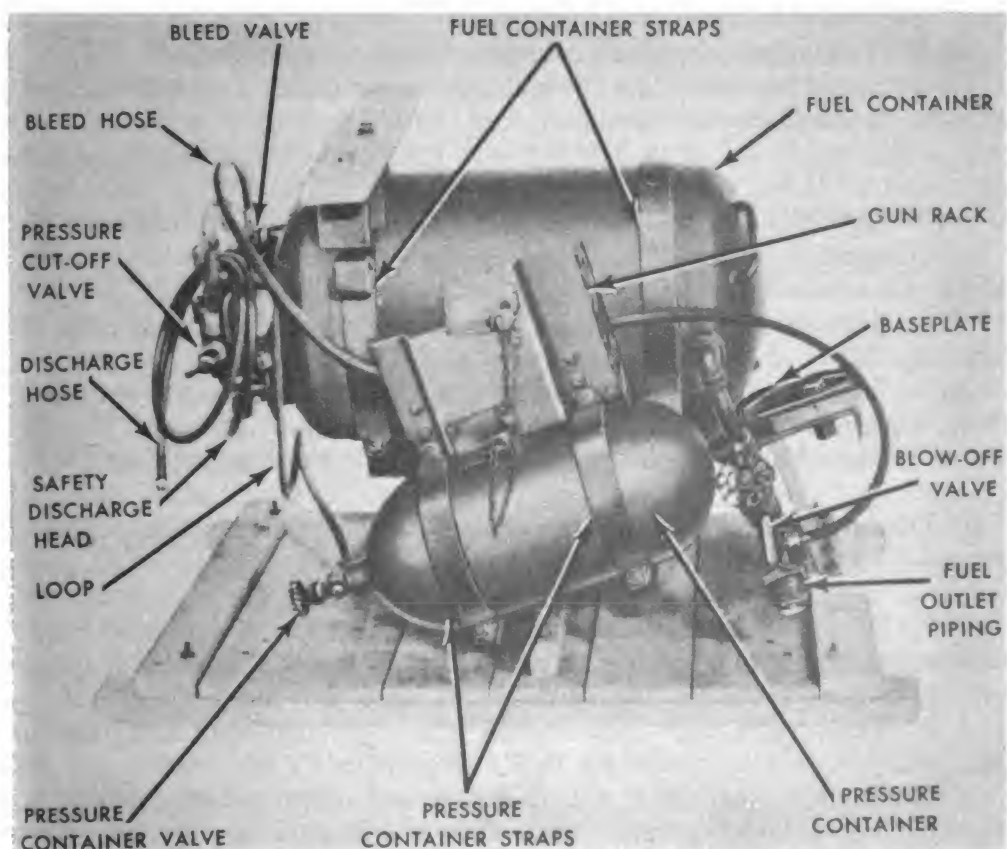


Fig. 25. Transmission fuel group ready for disassembly.

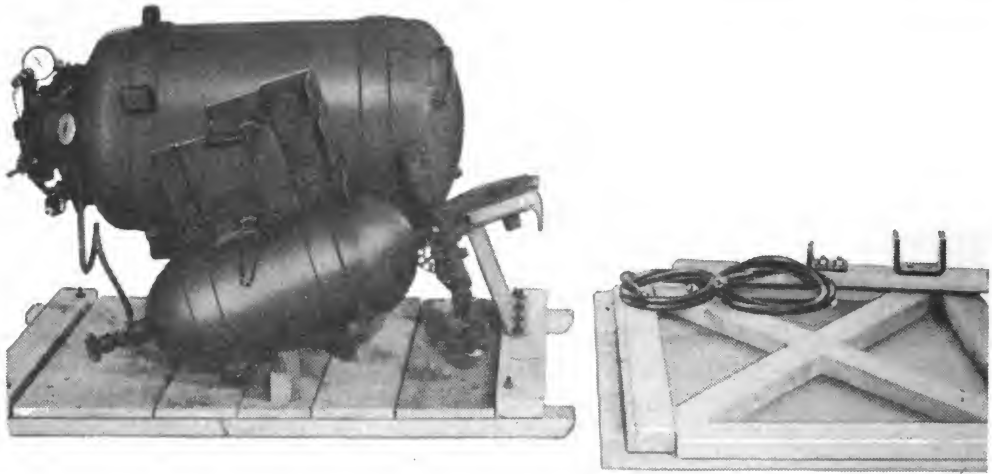


Fig. 26. U-bracket, discharge hose, bleed hose, and angle bracket removed from transmission fuel group.

- e. Attach loop provided for relocation of pressure container to pressure cut-off valve and pressure container valve.
- f. Mark location of saddle brackets on sponson shelf.
- g. Remove the loop and the pressure container.
- h. Weld saddle brackets to sponson shelf.
- i. Reinstall pressure container, loop, and pressure container straps. Tighten connections with wrench.

## 17. PREPARATION OF TRANSMISSION FUEL GROUP FOR INSTALLATION.

- a. Dismantling packing box. (1) Remove box lid and place on ground (inner side up) near box.  
 (2) Remove sides and ends of box, leaving fuel group on bottom of box (fig. 25).  
 (3) Lay all parts and assemblies on box lid as they are removed from the transmission fuel group.  
 (4) Remove rust-preventive materials from transmission fuel group.
- b. Disassembly of parts and assemblies from transmission fuel group. (1) Remove U-bracket and angle bracket, both of which are bolted to a board.  
 (2) Disconnect bleed hose by unscrewing hex nuts of hose from blow-off valve and bleed valve. Disconnect discharge hose by unscrewing hex nut of hose from low pressure safety head (fig. 26).  
 (3) Remove gun rack by unscrewing the four nuts, removing bolts, and lifting out rack.  
 (4) Remove loop, using adjustable wrench on union nut at pressure container valve and on pressure cut-off valve. Make sure synthetic rubber washer of coupling is kept with loop.  
 (5) Remove the front left pressure container strap by unscrewing

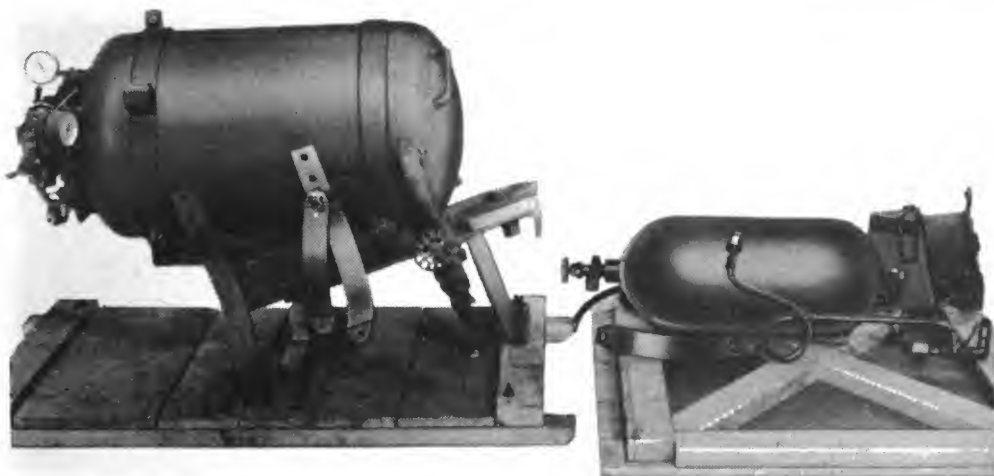


Fig. 27. Transmission fuel group with gun rack, loop, left front pressure container strap, and pressure container removed.

the two nuts at the bottom and the two nuts at the top.

(6) Remove two nuts from bottom of right front pressure container strap. Loosen two nuts at top of right front pressure container strap. Remove pressure container by sliding toward pressure line plate (fig. 27).

(7) Unscrew the two screws on fuel line clamp with screw driver.

(8) Disconnect union at fuel container outlet with one wrench on the nut and other wrench on hex of union, turning clockwise when facing the equipment. Attach half union protector to fuel outlet of fuel container. Screw thread protector cap on fuel outlet piping. Lift off fuel outlet piping and the clamp.

(9) Disconnect union between fuel container and pressure line.

(10) Unscrew the three stud bolts which hold pressure line plate to fuel container. Remove plate, bolts, and lock washers (fig. 28). A synthetic rubber washer is located at this connection. With synthetic rubber washer in place on inlet, screw thread protector cap on union of fuel container pressure inlet.

(11) Remove back pressure container strap assembly by removing the four bolts (fig. 29).

(12) Remove low pressure gage from fuel container.

(13) Remove the two fuel container straps by loosening the two nuts at each end of the straps, but do not remove stud bolts.

(14) Lift fuel container from baseplate (fig. 30).

(15) Remove baseplate by unbolting the two bolts holding base to wooden skid of packing box.

## 18. MOUNTING OF TRANSMISSION FUEL GROUP.

Five men are required to mount and install the transmission fuel group. One man is located in the driver's seat, another in assistant driver's position, and a third in the turret. Two men remain outside the vehicle. To provide unobstructed views of the operations, figures in this sec-



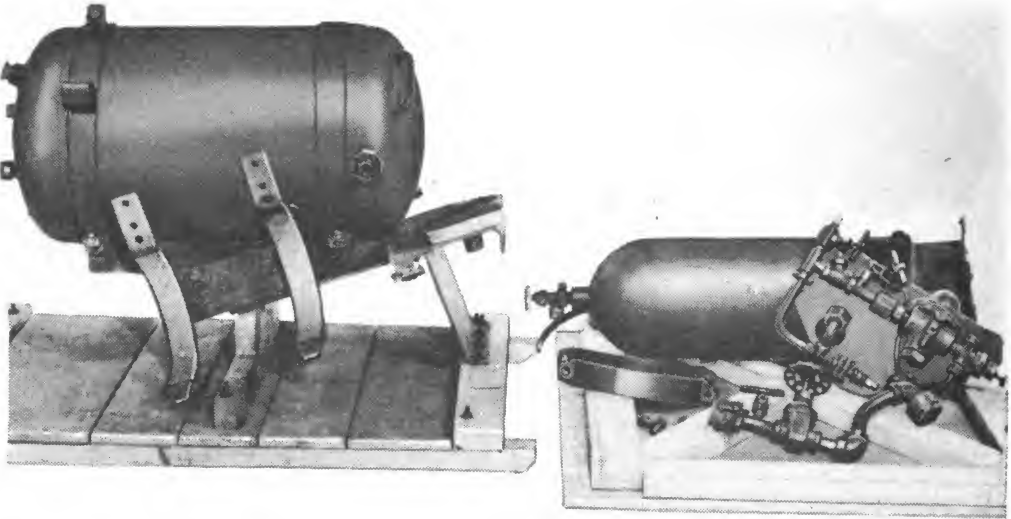


Fig. 28. Transmission fuel group with fuel outlet piping, pressure line plate, and right front fuel container strap removed.

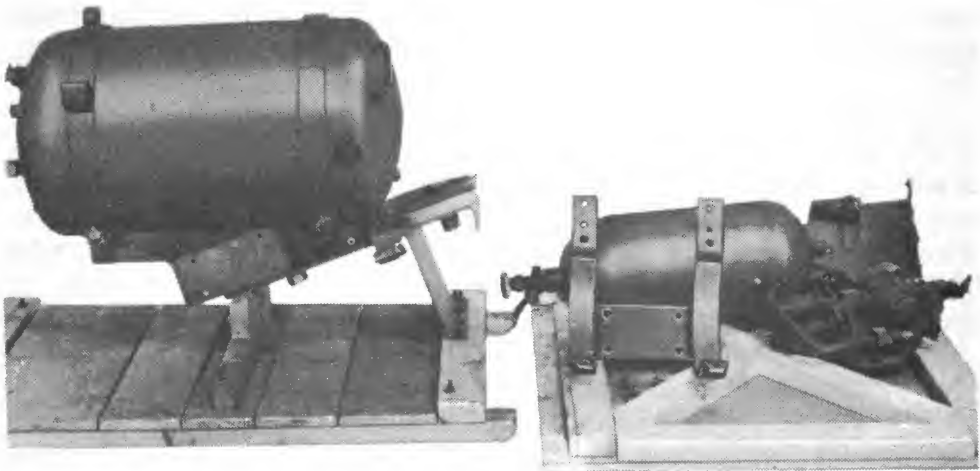


Fig. 29. Back pressure container strap assembly removed.

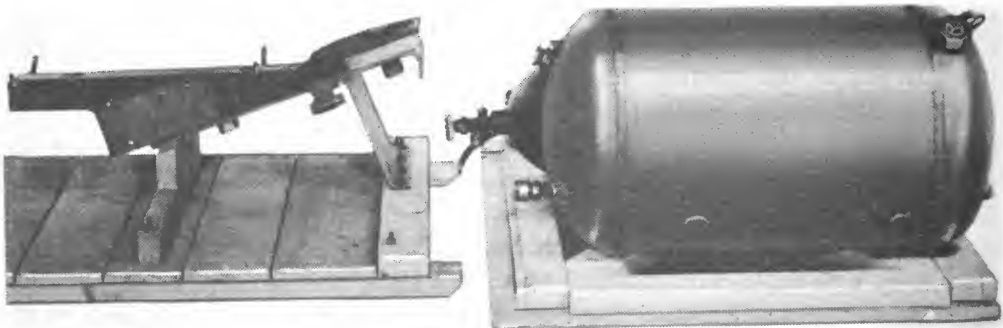


Fig. 30. Fuel container and straps removed from baseplate.



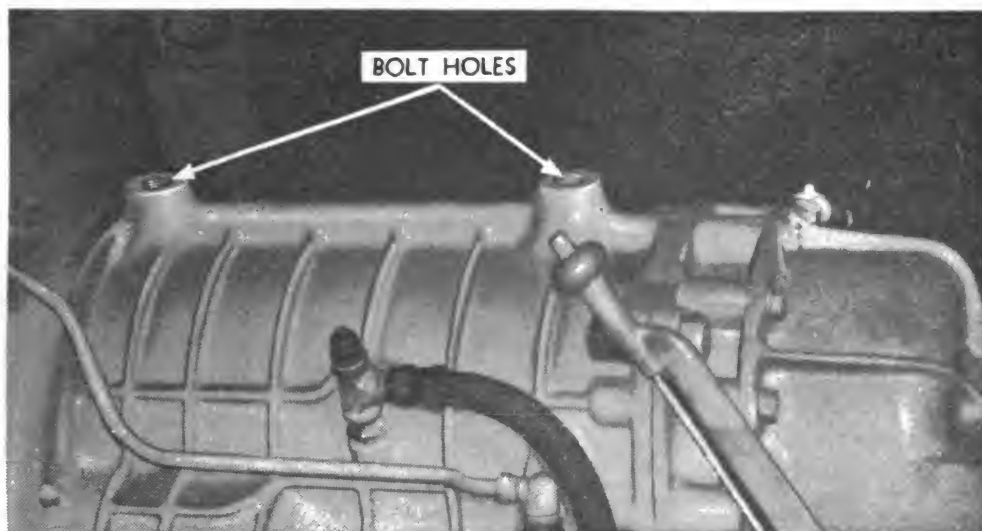


Fig. 31. Transmission case, showing bolt holes where transmission fuel group baseplate is to be mounted.

tion show installation on a mock-up transmission case. The five men work together to perform the following installations:

a. Baseplate. (1) Pass baseplate through driver's door to man in driver's seat.

(2) Place baseplate on transmission case so that slotted holes in baseplate are over the two holes in the transmission case (fig. 31). Inclined part of baseplate should face turret.

(3) Place bolts through slotted holes in baseplate (fig. 32). Make bolts handtight only. (Do not tighten with wrenches at this time.)

b. Fuel container. (1) Pass fuel container through turret hatch by means of rope attached to handle of fuel container.

(2) Slide container across floor of turret, making sure container does not strike any hard objects.

(3) Disconnect rope.

(4) Pass fuel container through opening in back of assistant driver's position and slide it onto baseplate. Handle must be to the front, and pressure inlet to the rear.

(5) Rotate container until the two circular pads on sides of container engage corresponding holes in baseplate.

c. Fuel container straps. (1) Slide both fuel container straps over fuel container. Front strap is the plain strap; rear strap has a bracket and projection with a threaded hole through it.

(2) Line up one end of front strap so hole in strap fits over bolt on baseplate. Place nut on bolt and turn two or three times until it is engaged.

(3) Using 8-inch adjustable end wrench as a lever, pull down other end of front strap until bolt from baseplate is through hole in end of strap. Place nut on bolt and engage threads.

(4) With one man on each side of fuel group, tighten nuts on both

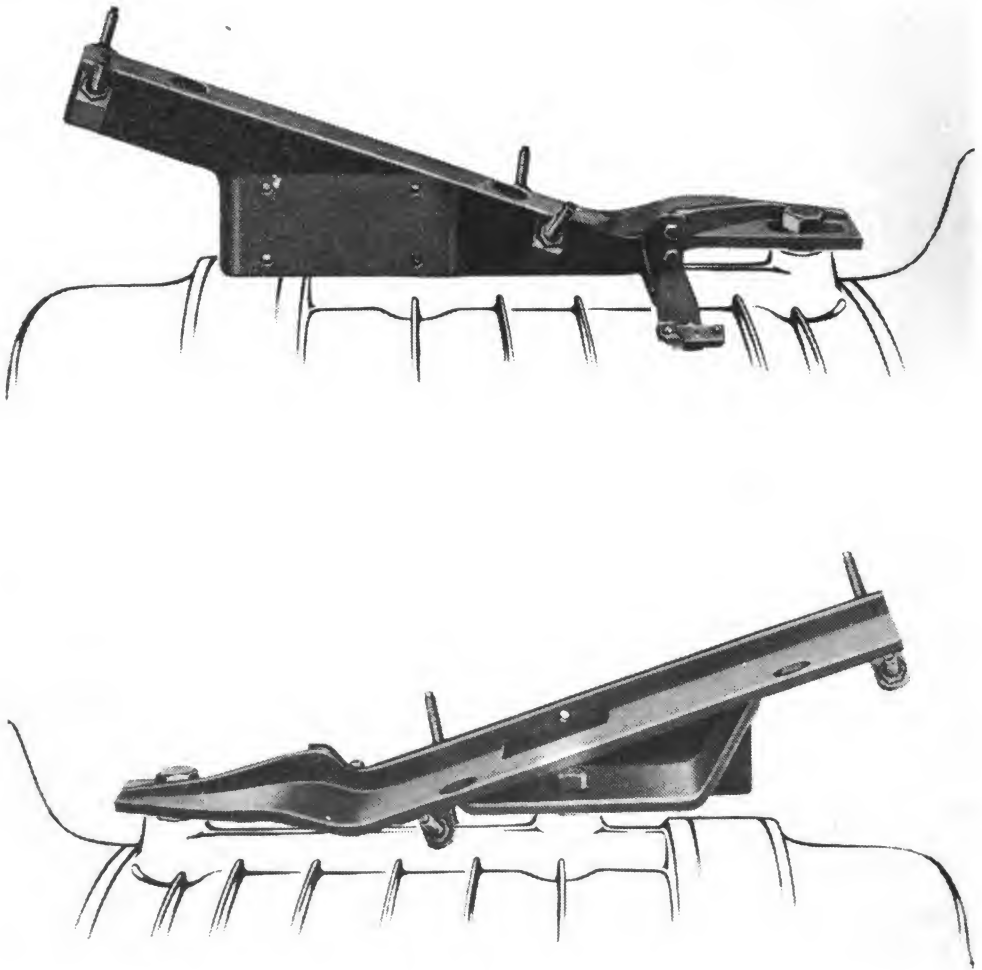


Fig. 32. Baseplate viewed from assistant driver's seat (above) and driver's seat (below).

ends of straps simultaneously until strap is flat against fuel container.

(5) Place a second nut over each of first two nuts and tighten them.

(6) Repeat procedures (2) through (5) above with rear fuel container strap.

(7) Install low pressure gage on fuel container.

d. Pressure line plate. (1) Replace synthetic rubber washer in recess of male fitting of fuel container pressure inlet union.

(2) Hold pressure line plate at end of fuel container. Insert three stud bolts through holes in plate and engage them in threaded bosses in order to hold pressure line plate to fuel container (fig. 33). Check alinement of pressure line union with half union on fuel container. Nut must engage threads on half union fully without necessity of forcing.

(3) Tighten all three stud bolts uniformly.

(4) Tighten nut on pressure line union.



Fig. 33. Fuel container, fuel container straps, and pressure line plate installed on transmission fuel group baseplate.

(5) Place synthetic rubber washer in recess of half union on top of pressure cut-off valve.

(6) Attach high pressure line assembly (loop) to pressure cut-off valve by engaging nut of half union on assembly with male connection of half union of pressure cut-off valve. Make handtight.

e. Back pressure container straps and right front pressure container strap. Connect back pressure container strap and right front pressure container strap by inserting four stud bolts through the four holes in back pressure container strap assembly and engaging bolts to tapped holes in the side of the baseplate (fig. 34). Tighten all four stud bolts uniformly.

f. Pressure container. (1) Place pressure container on back pressure container straps and hold container in place by inserting bolt through right front pressure container strap. Remove thread protector cap from pressure container valve. Aline outlet of pressure container valve with connection on end of loop. Connect loop to pressure container valve (fig. 35). Install left front pressure container strap. Tighten both ends of each strap evenly so gaps between "ears" at ends of each front and each back strap are equal; otherwise, there will be insufficient space on the top strap to insert gun rack.

(2) Tighten nut on end of loop adjacent to pressure container. Tighten union nut at pressure cut-off valve.

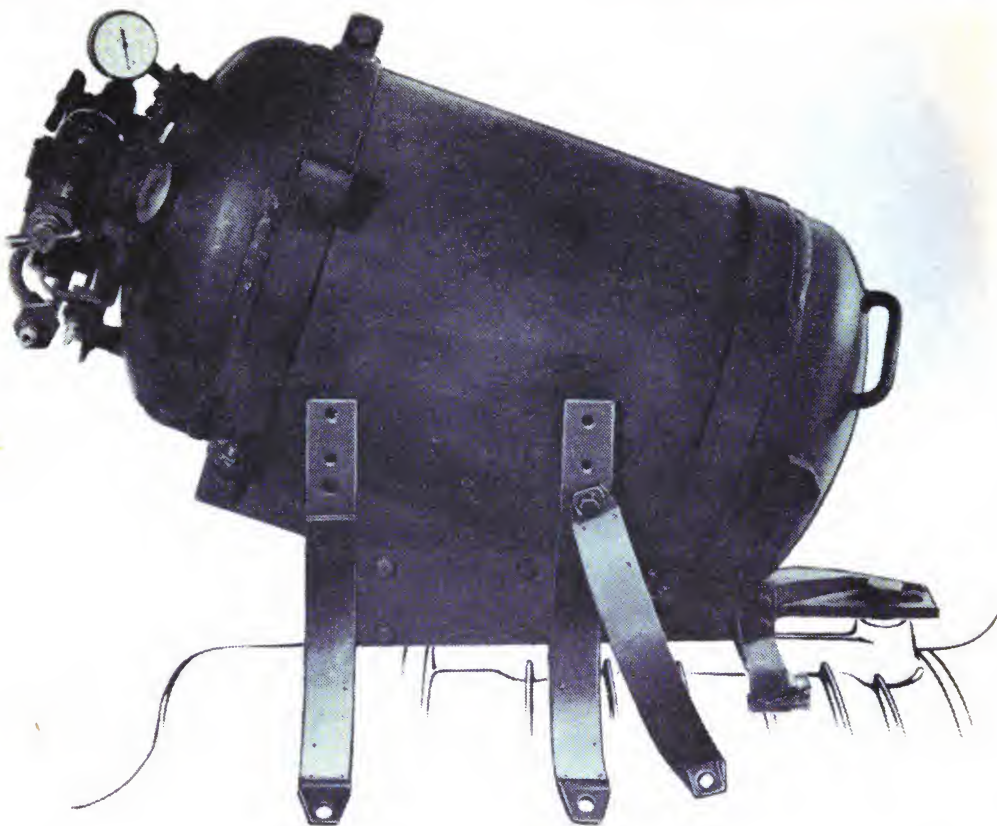


Fig. 34. Back pressure container straps and right front pressure container strap ready to receive pressure container.

g. Fuel outlet piping. (1) Remove half union protector from fuel container outlet and remove thread protector cap from fuel outlet piping. Attach fuel outlet piping to fuel container (fig. 36) by engaging nut on half union at fuel container with male half angle union at fuel outlet piping.

(2) Attach fuel line clamp and clamp fillers (shims) to angle bracket (bolted to baseplate) by inserting screws through holes in clamp, fillers, and tapped holes in block on bracket. Tighten screws with screw driver.

(3) Tighten union between fuel outlet piping and fuel container, using wrench on nut and on half union at fuel container.

h. Gun rack. Place gun rack on top of pressure container. Insert four bolts (with flat washers) through the four holes in gun rack and ends of back pressure container straps. Insert flat washer, lock washer, and nut over exposed end of each bolt and tighten uniformly.

i. Angle bracket. Attach angle bracket to back fuel strap on top of fuel container by sliding slot of bracket over bolt in "ear" at end of fuel container strap. Bolt should be as high as possible in slot.

j. Bleed hose. (1) Screw nut on end of bleed hose to the fitting at top of bleed valve.

(2) Screw nut on other end of bleed hose to fitting on blow-off valve. Tighten with wrench.





Fig. 35. Pressure container, right front pressure container strap, and loop installed on transmission fuel group.

k. Discharge hose. Screw one end of safety head discharge hose on low pressure safety head. Tighten with wrench. Transmission fuel group is now completely assembled (fig. 37).

#### 19. ADJUSTING POSITION OF TRANSMISSION FUEL GROUP IN VEHICLE.

Slotted holes in the baseplate are provided so that the transmission fuel group can be slid forward or backward on transmission case in order for piping and controls on pressure line plate to clear projections on turret. After fuel group has been mounted on transmission case:

a. Rotate turret slowly to check clearances between projections on turret and pressure lines. Slide fuel group as required to establish necessary clearances.

b. After clearances have been established, tighten the two stud bolts (between transmission case and baseplate), using wrench.

#### 20. INSTALLING U-BRACKET.

In some vehicles it may be necessary to remove blower system from roof in order to install transmission group. In these instances, the angle bracket may be directly under the hole from which blower system was removed. In this instance, weld a flat piece of sturdy metal across this hole and spot weld U-bracket to this piece.

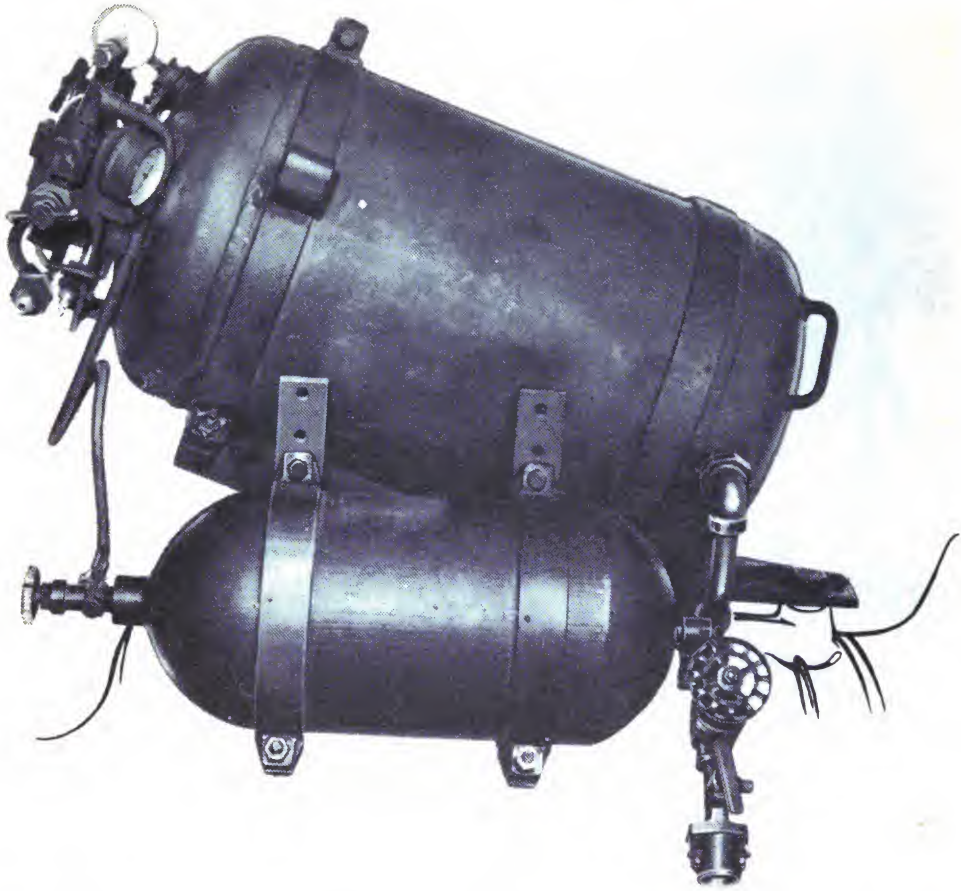


Fig. 36. Pressure system and fuel outlet piping installed on transmission fuel group.

- a. Measure distances between roof of vehicle and top of the angle bracket at highest and lowest points.
- b. Cut U-bracket with cutting torch so that U-bracket can be spot welded to roof of vehicle and can be attached to the angle bracket. In this way, fuel group is secured both to transmission case and roof of vehicle, eliminating swaying or pitching motion of fuel group.
- c. Check to see that fit of U-bracket is correct.
- d. Connect U-bracket to angle bracket, using two stud bolts and flat washers. Do not tighten.
- e. Shift U-bracket backward and forward. Raise angle bracket until contact is made with roof of vehicle. Tighten the two bolts on U-bracket and the bolt on the angle bracket.
- f. Tack weld U-bracket to roof of vehicle at four or more points on each side of U-bracket (fig. 38).

## 21. SECURING FREE END OF DISCHARGE HOSE OF TRANSMISSION FUEL GROUP TO SPONSON SHELF OF VEHICLE.

- a. Drill or burn hole through right sponson shelf adjacent to hole

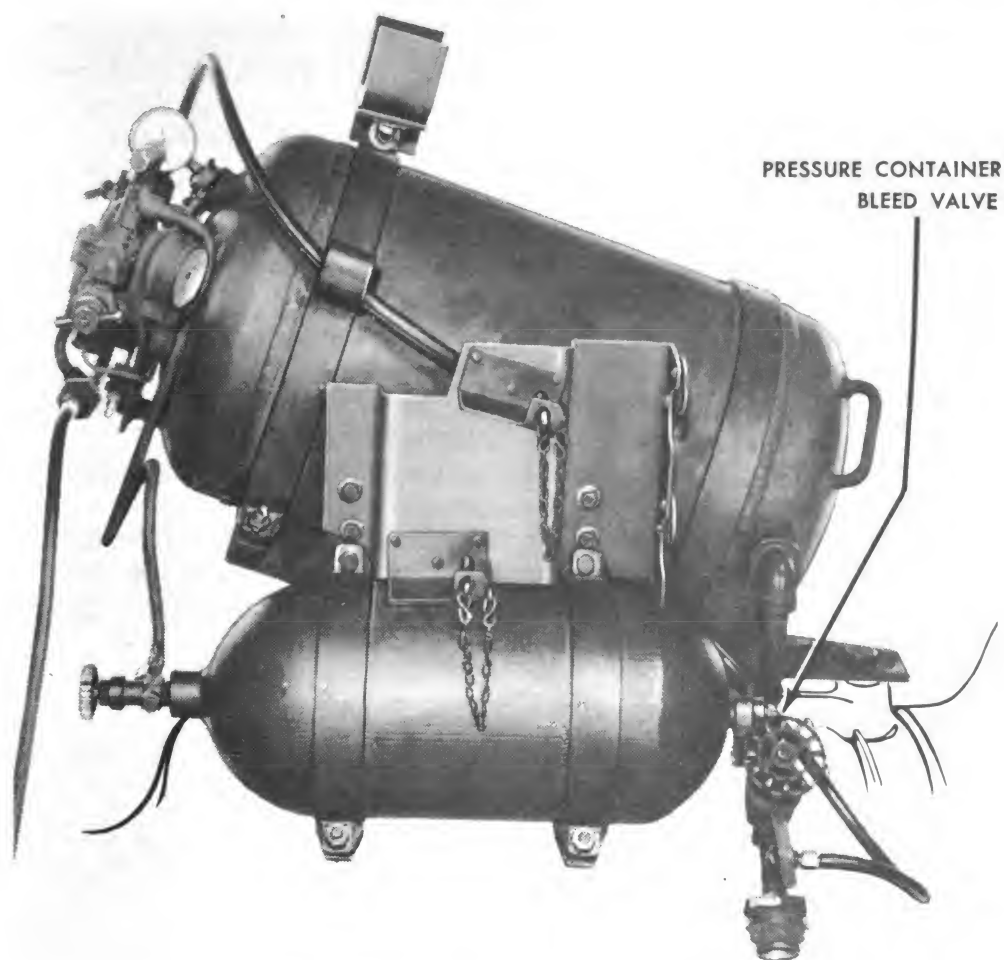


Fig. 37. Transmission fuel group completely assembled.



Fig. 38. Transmission fuel group installed, and U-bracket welded to roof of vehicle.



made for discharge hose of sponson fuel group.

b. Pass discharge hose around rear of assistant driver's seat and through hole in sponson shelf.

c. Secure to sponson shelf as described in paragraph 15.

## 22. ADJUSTING PRESSURE REGULATORS.

Pressure regulators of both the fuel groups are shipped without pressure on the dome. Adjust pressure regulators as described in section XVIII.

## 23. INSTALLING GUN GROUP.

Remove gun group and external wiring from gun chest. Remove rust-preventive materials, clean, and lubricate (sec. XIII).

a. External wiring. Connect external wiring of flamegun to vehicle as follows:

(1) Remove two of the stud bolts which are in front of the assistant driver's side of the vehicle, located just below and to the right of the ball mount socket. The two bolts to be removed are approximately 12 inches above the tank floor. These bolts have the same centers as the fuse box bracket.

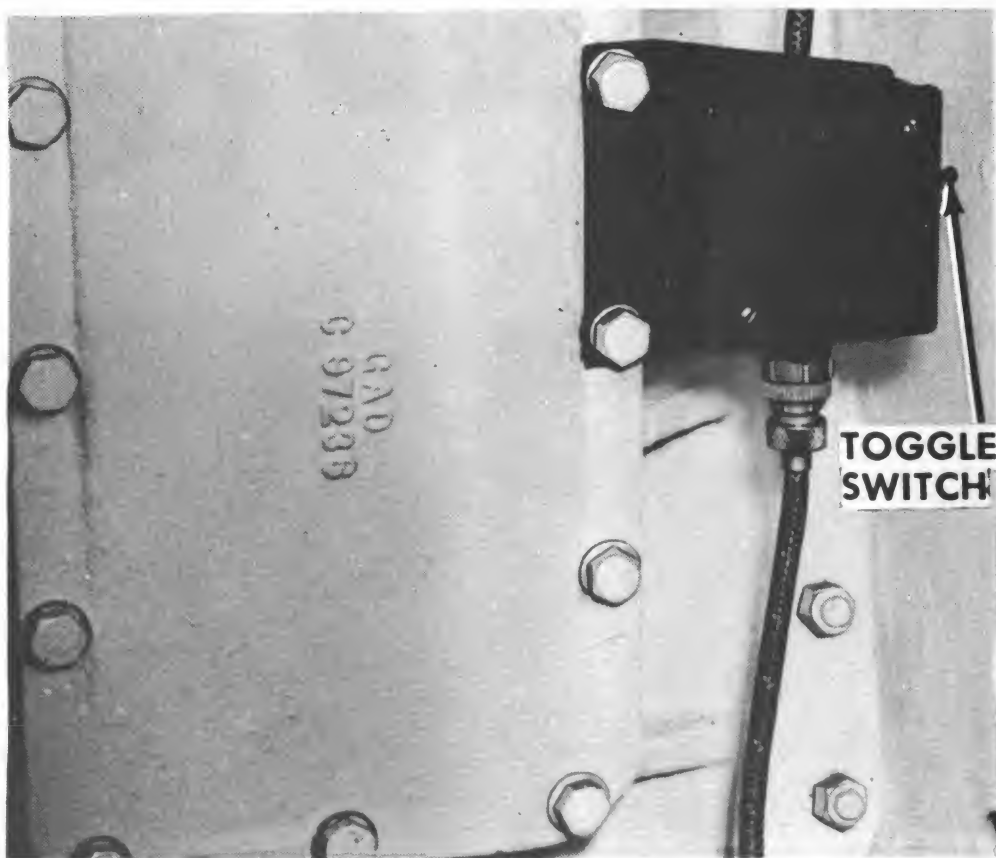


Fig. 39. Switch fuse box installed on hull.

(2) Mount switch fuse box over the two holes. Replace and tighten the two bolts with a wrench (fig. 39).

NOTE: If desired, the box can be mounted on the front slope of the vehicle in front of the assistant driver. It is secured to the slope by spot welding. The location, however, must be such that the box does not interfere with the traverse, elevation, and depression of the gun.

(3) Lay shielded wire lead around front of interior of vehicle, past the driver's position and the radio, to the battery or master switch box of the vehicle. Secure lead in this position by attaching clips to the hull and to master switch box if terminal of lead is to be attached to 12-volt switch.

(4) Connect battery lead to 12-volt terminal of battery or to 12-volt switch in master switch box.

(5) Gun lead wire is not connected to gun until the gun is installed.

(6) Check to see if fuse is properly installed in switch fuse box.

b. Barrel assembly. (1) Preparatory procedure for installation of barrel assembly.

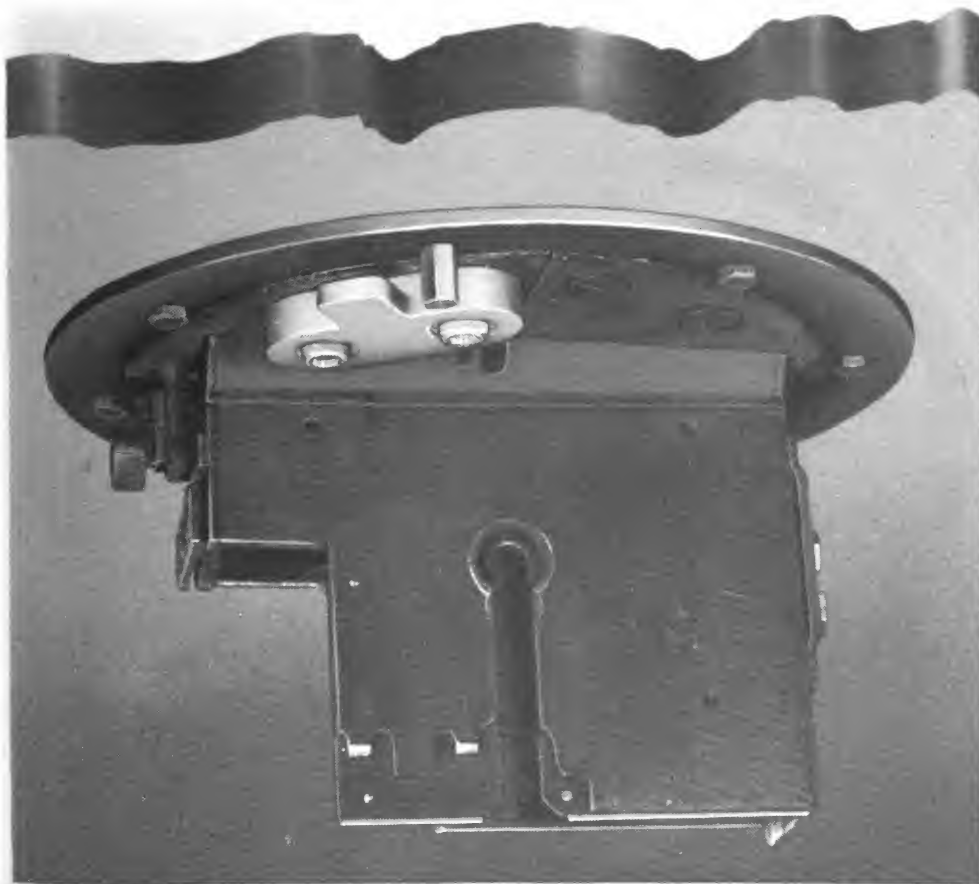


Fig. 40. Traverse limit stop plate and pin installed.

(a) Remove standard periscope holder by unscrewing the screws from the two split-plates on the underside of the mount. (Some periscope mounts may have a ring which secures the periscope holder to the assistant driver's door. This ring must be removed.)

(b) Install specially designed periscope holder (included with each flame thrower), without the periscope, into assistant driver's door, by reversing the procedure for removal of the standard holder.

(c) Attach the traverse limit stop plate to the split-plate with the two cap screws supplied. Mount the traverse limit stop pin to the periscope mounting ring (fig. 40). If mount has no bolt ring, weld pin to underside of hatch door. The pin should be located to give a traverse of 45 degrees left of the vehicle front (fig. 41).

(d) Attach depression limit stop plate to the left side of periscope holder (side opposite vertical lock screw) by inserting the two cap screws in the existing holes.

(e) Separate barrel assembly from gun control assembly in the following manner (fig. 42):

- Loosen barrel coupling tightening knob and raise it so that eyebolt is clear of locking grip on coupling bracket assembly.
- With the eyebolt clear of the locking grip, pull back and downward on mounting bracket so that hooks on both sides

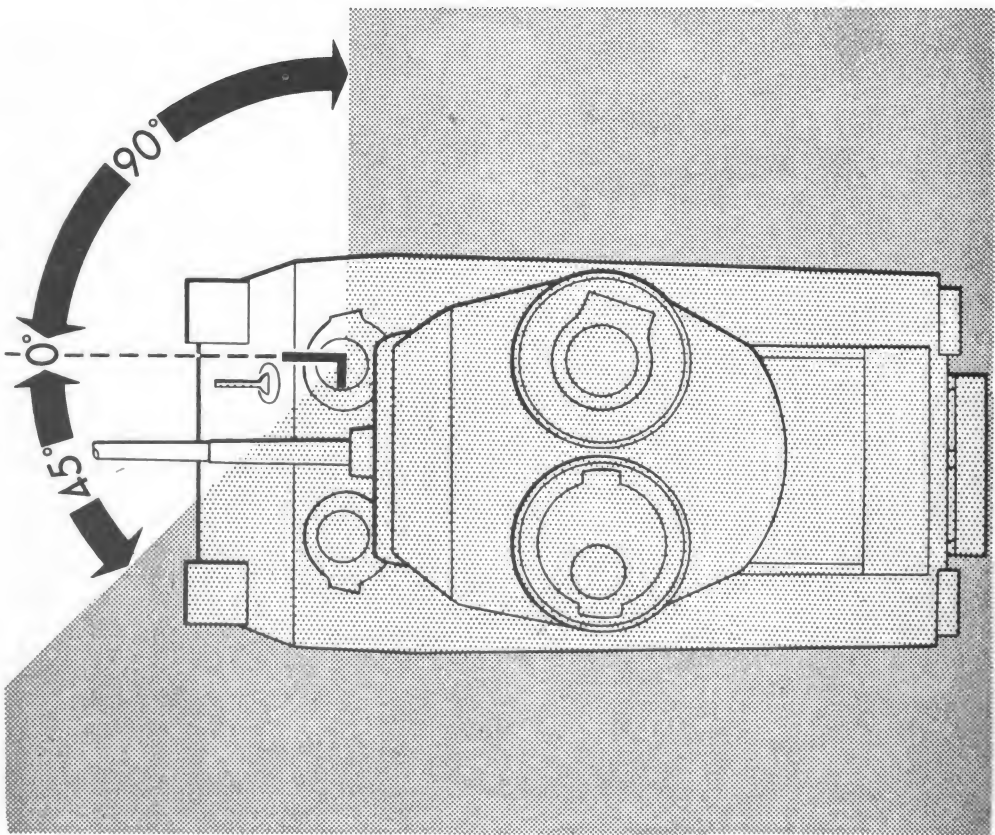


Fig. 41. Traverse limit diagram.

of the bracket assembly disengage the barrel coupling pins.

--Lift barrel assembly from gun control assembly.

(2) Installation of barrel assembly. Figure 43 shows the series of operations used to install the barrel assembly.

c. Periscope. To install periscope, turn knurled knob counterclockwise as far as it will go. (Do not attempt to remove knob.) Follow operations shown in figure 44 for installation sequence.

d. Gun control group. Connect gun control group to barrel assembly by procedure given in figure 45.

e. Gun hose. (1) To install hose in gun, screw hose into discharge

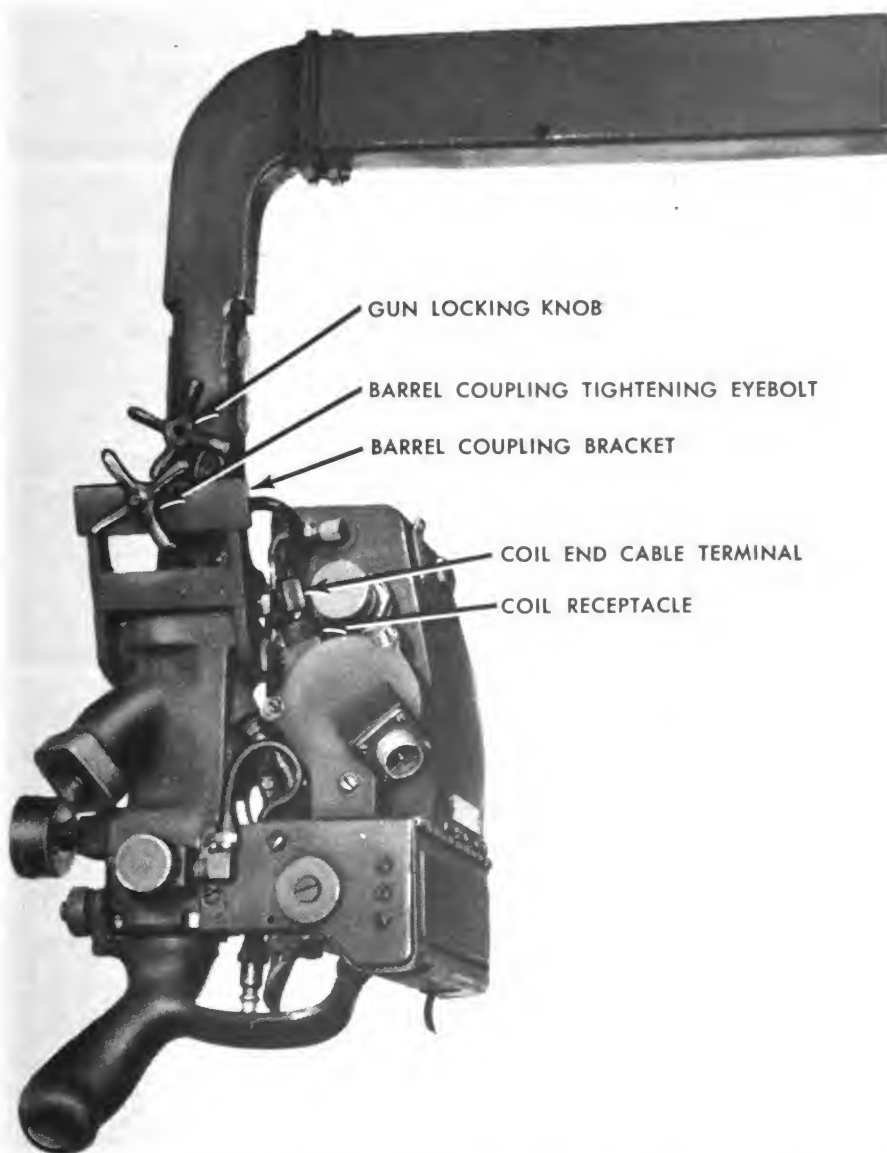
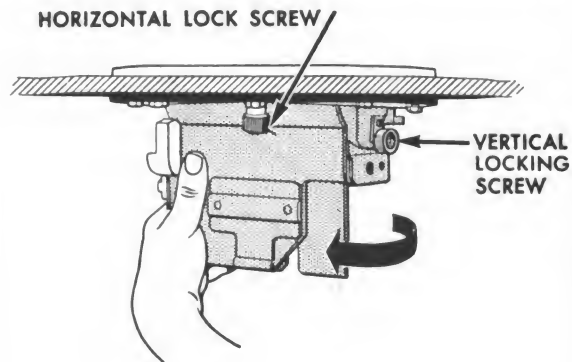


Fig. 42. Gun showing components for disconnecting and connecting barrel assembly to gun control assembly.

## BARREL ASSEMBLY INSTALLATION

Mounting Barrel Assembly  
in Specially Designed  
Periscope Holder

**1.** Rotate periscope holder so that vertical lockingscrew is to right and periscope holder is at a 45-degree angle to front of vehicle.



**2.** Insert flame shield through periscope holder as far as possible.

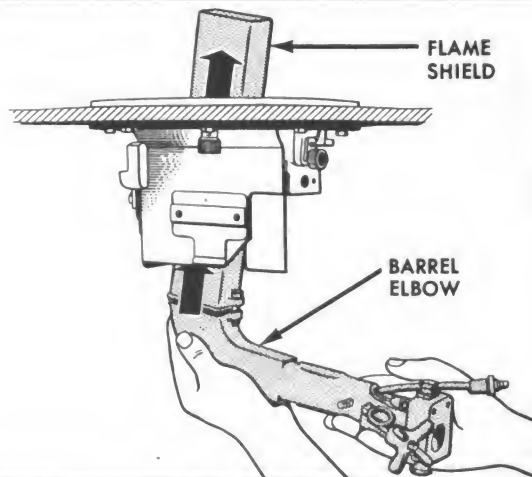
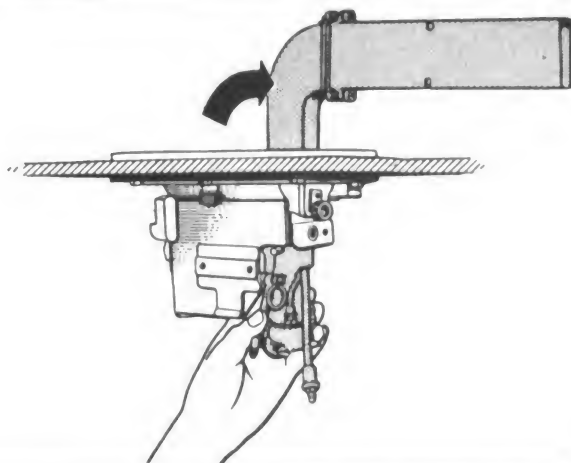
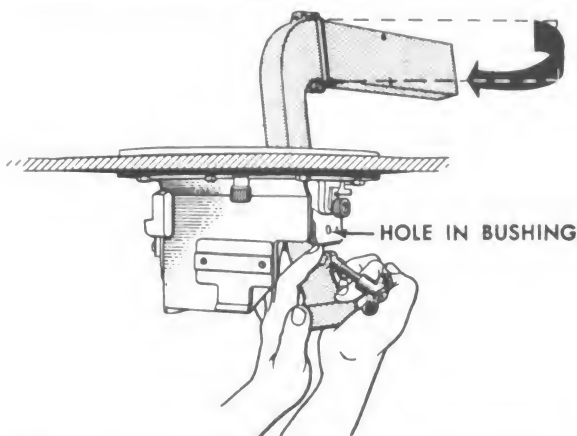


Fig. 43.

**3.** Manipulate assembly so that barrel elbow is vertical and flame shield is horizontal.



**4.** Rotate barrel assembly to left so that barrel locking stud is aligned with hole in bushing on periscope holder.



**5.** Manipulate assembly so that stud passes through bushing. Screw on barrel locking knob.

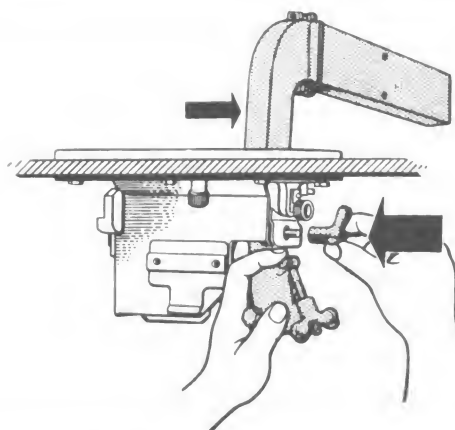
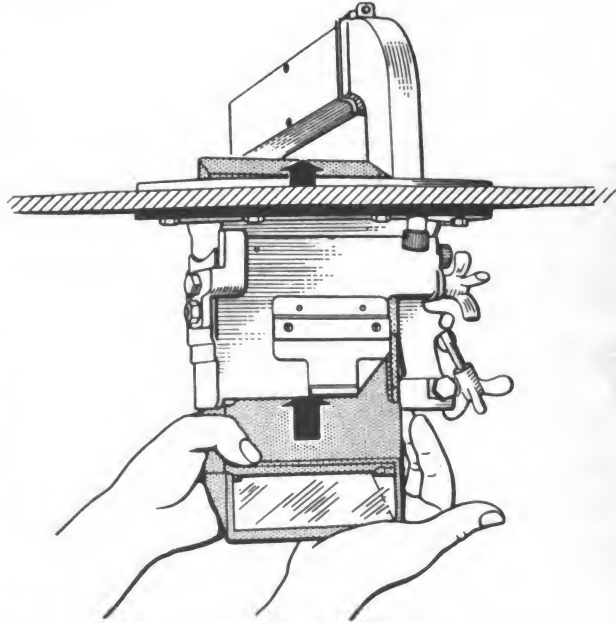


Fig. 43.



## INSTALLATION OF PERISCOPE

**1.** Slide periscope into periscope holder as far as possible.



**2.** Rotate periscope to left; see that knurled knob is at top of slot. Tighten knob hand-tight.

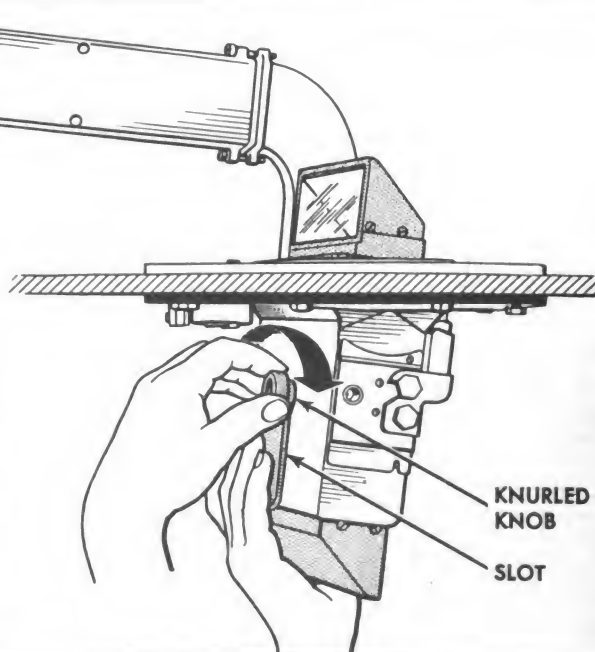
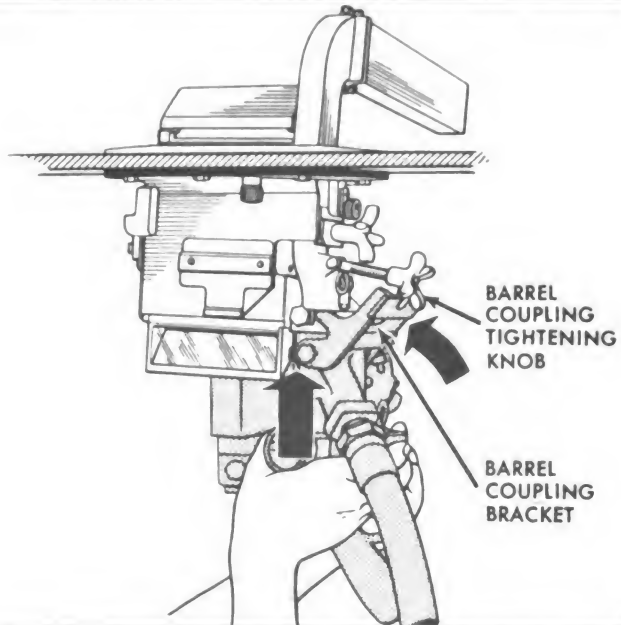


Fig. 44.



## INSTALLATION OF GUN CONTROL ASSEMBLY

**1.** Butt top of discharge valve assembly to base of barrel assembly. Push bracket forward and over coupling pins.



**2.** Lower coupling eyebolt and engage slot on bracket. Tighten barrel coupling knob.

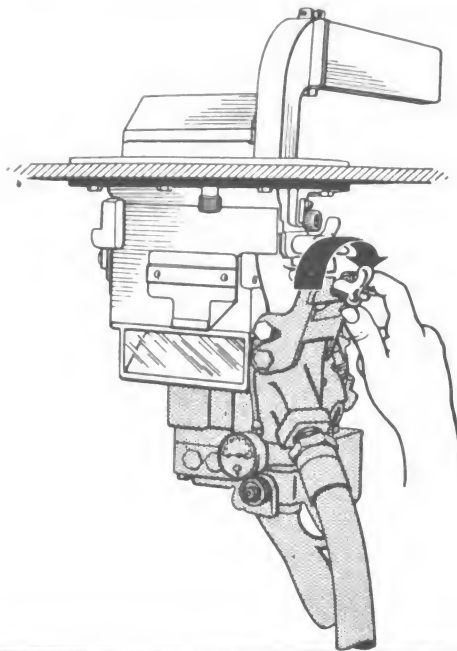


Fig. 45.



Fig. 46. Inserting gun hose nipple in coupling. (Synthetic washer must be in coupling.)



Fig. 47. Closing two cams so they lie flat against coupling body.



Fig. 48. Closing coupling lock until it covers ends of cams.

valve body by hand. Using two wrenches, one on squared end of valve and one on hex end of hose, tighten connection.

NOTE: Remove hose from gun only when necessary for maintenance.

(2) To attach hose to fuel outlet piping of either fuel group:

- Check to make sure coupling washer is in place in coupling body. Be sure washer is not damaged or swollen.
- Open coupling lock and pull out the two cams from the coupling.
- Insert unthreaded hose nipple in coupling as far as possible (fig. 46).
- Close cams so that they lie flat against coupling body (fig. 47).
- Close coupling lock (fig. 48), being sure to push it all the way up, so that it covers ends of both cams.
- Test tightness of coupling by attempting to pull hose from coupling.

f. Air hose. (1) To install hose on gun, snap hose socket onto the hose plug, which is located on the rear of the valve block.

(2) To attach hose to the plug on the air line valve of fuel group, snap hose socket onto plug of air line valve.

## Section VI. CONTROLS AND INSTRUMENTS.

### 24. FUEL GROUPS.

Controls and instruments of sponson and transmission fuel groups are identical in operation. They are within reach of assistant driver when he is seated. Controls and instruments of sponson fuel group (fig. 49) are at his right; those of the transmission fuel group (fig. 50) are at his left.

a. Pressure container valve. This valve is mounted at the front end of the pressure container. When closed, the valve retains high pressure in the pressure container. When opened, it permits charging of container and allows release of compressed air to the high pressure line. To open valve, turn handle counterclockwise by hand; to close valve, turn handle clockwise by hand. Do not use wrench.

b. High pressure line gage. This 0- to 3,000-pound high pressure gage is located on the pressure line plate. It indicates pounds per square inch of pressure in the pressure container. Pressure container valve must be opened before gage indicates pressure in pressure container.

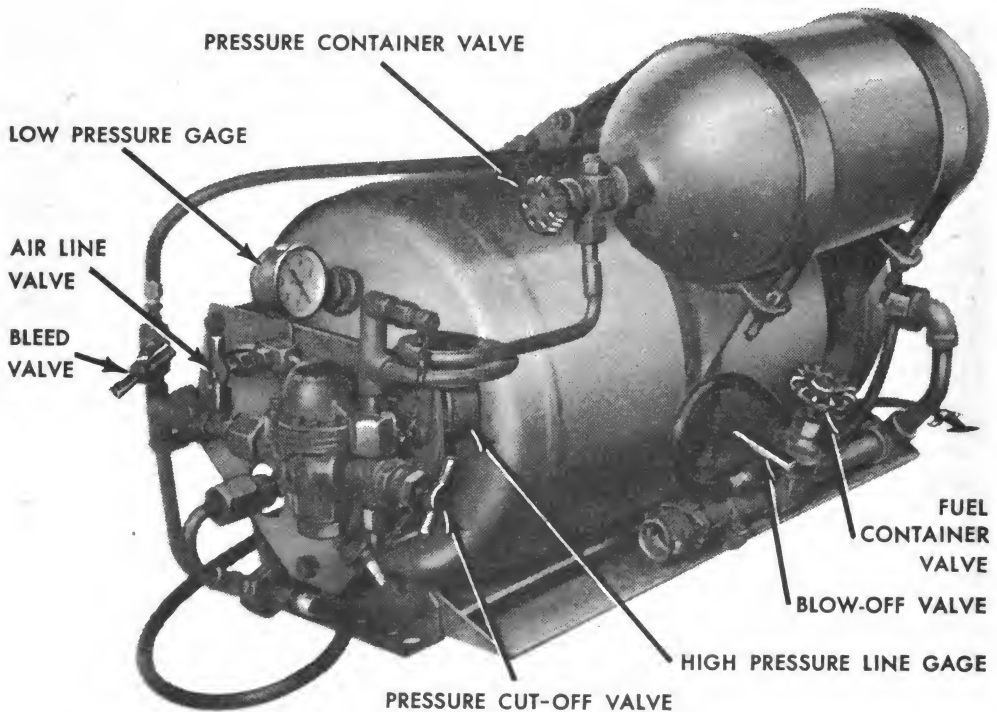


Fig. 49. Controls and instruments of sponson fuel group.

c. Pressure cut-off valve. This valve is connected to the pressure regulator. When opened, it allows passage of compressed air through the regulator. When closed, it permits charging of pressure container without allowing entry of pressure to pressure regulator and fuel container. To open valve, turn handle counterclockwise by hand. To close valve, turn handle clockwise. Do not use wrench.

d. Bleed valve. This valve is located on the pressure line plate between a tee and bleed hose. During fuel filling operation, with bleed hose disconnected at blow-off valve, opening of bleed valve permits air in fuel container to escape, allowing container to fill with fuel. When fuel runs out of bleed hose, container is filled with fuel.

e. Air line valve. This valve is located on the pressure line plate. The valve controls the flow of compressed air necessary to operate the valves of the flame gun and controls the air which blows ignition gasoline around the stream of flame thrower fuel as the fuel leaves the nozzle. To open valve, turn handle counterclockwise. To close valve, turn handle clockwise. Do not use wrench.

f. Blow-off valve. This valve is located on fuel outlet piping, between fuel container valve and nipple leading to coupling. Valve is opened to permit remaining fuel under pressure (in gun hose and in fuel outlet piping beyond fuel container valve) to pass through the gun hose and to be discharged from the gun. To open valve, turn handle counterclockwise. To close valve, turn handle clockwise. Do not use wrench.

g. Fuel container valve. This valve is located on the fuel outlet

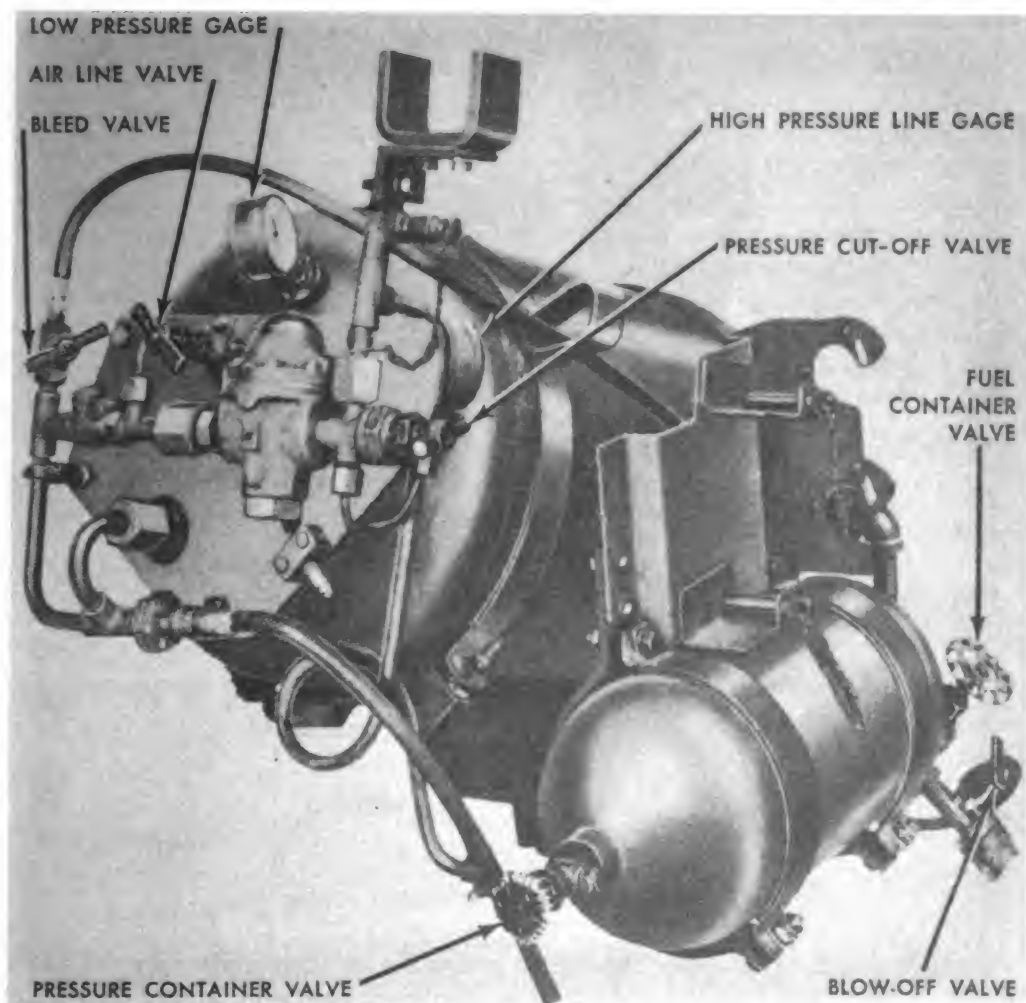


Fig. 50. Controls and instruments of transmission fuel group.

pipng. The valve controls the supply of fuel from the fuel container to the gun. To open valve, turn handle counterclockwise. To close valve, turn handle clockwise. Do not use wrench.

**h. Low pressure gage.** This 0- to 600-pound gage is located on the front end of the fuel container. When the pressure container valve and the pressure cut-off valve are open, the gage indicates the pounds per square inch of pressure in the fuel container and is a constant check on the adjustment of the pressure regulator.

## 25. GUN GROUP (fig. 51).

**a. Toggle switch.** This switch controls the electric current required to operate the flame gun. It is located on the switch fuse box. Operation of the switch closes or opens the ignition circuit, permitting functioning of the spark plug when the trigger is pulled.

**b. Pump.** This is a hand pump used to build up the pressure in the

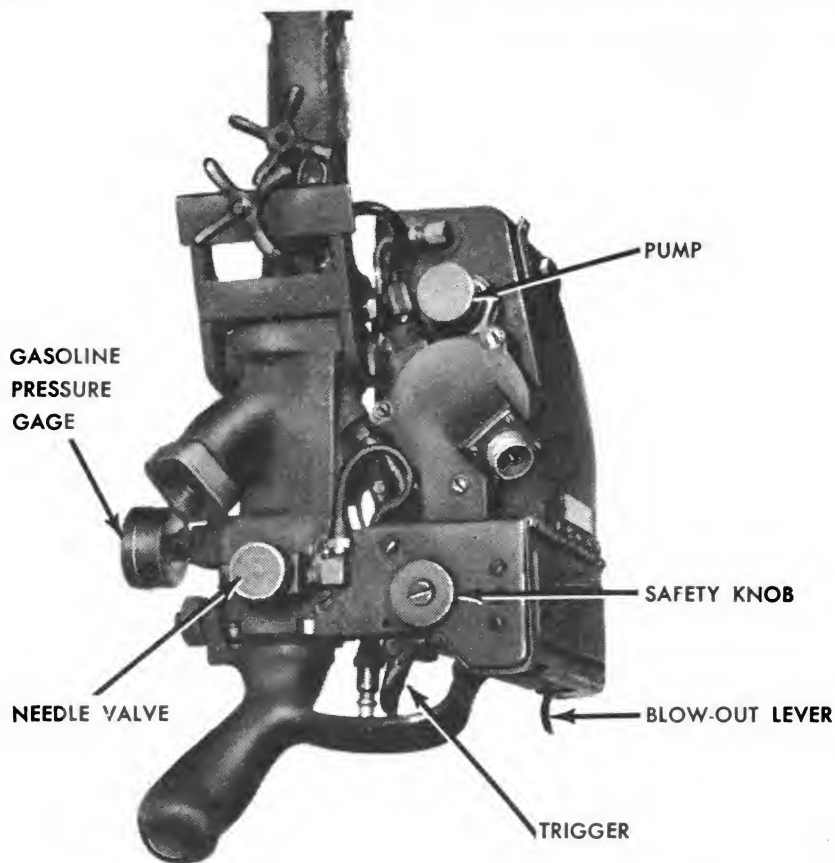


Fig. 51. Controls and instrument on the gun.

gasoline container to the operating pressure of 30 pounds per square inch. It is located on the side of the gasoline reservoir above the coil cap. To operate, turn pump handle two or three complete turns counter-clockwise to unlock. Build up pressure by pulling and pushing on the handle until the gasoline pressure gage indicates 30 pounds per square inch. When operating pressure is reached, lock pump by pushing handle forward as far as it can go and then turn handle clockwise two or three turns. If it is desired to release the pressure in the gasoline reservoir without firing the gun, unscrew gasoline filler plug just enough to permit the air to escape.

c. Gasoline pressure gage. This gage, screwed into the discharge valve housing, indicates the air pressure in the gasoline container. The gage records pressures up to 30 pounds per square inch. To aid the reading of the gage, the quadrant from 0 to 15 pounds per square inch is painted red to indicate inadequate operating pressure.

d. Trigger. The trigger, which is located above the trigger guard, controls the operation of the flame gun. Pulling on the trigger operates the spark plug and simultaneously regulates flow of air, gasoline, and fuel through the system. The atomized gasoline is ignited by the spark from the spark plug, thereby producing the ignition flame which in turn

ignites the flame thrower fuel.

e. Blow-out lever. This manually operated lever is used to blow out the remaining fuel from the gun upon completion of firing. The lever projects below the valve housing cover and operates when depressed.

f. Trigger safety knob. The knob, located above the trigger on the right side of the valve block, locks the trigger in the "safe" position. To lock the trigger, turn the knob clockwise as far as it will go. To unlock the trigger, turn the knob in the counterclockwise direction until a click is heard.

g. Air cylinder needle valve. The valve is located on the right side of the air cylinder above the gun grip and controls the flow of fuel from the gun hose to the flame gun. To open the valve, turn the valve knob in a counterclockwise direction. To close, turn knob in clockwise direction.

## **Section VII. OPERATION UNDER USUAL CONDITIONS.**

### **26. GENERAL.**

Before starting on a mission which may involve use of the flame thrower, proceed as follows:

a. Install flame gun. Mount flame gun in periscope holder (par. 23).  
b. Perform before-operation service. Perform services described in paragraph 43.

c. Connect flame gun to fuel group. Connect unthreaded nipple of gun hose to coupling on fuel outlet piping of the fuel group to be used first (par. 23).

d. Test fire. Test fire weapon in the following sequence:

- (1) Pump 30 pounds pressure into gasoline reservoir.
- (2) Open pressure container valve all the way and observe reading on high pressure line gage. Reading should show pressure of at least 1,800 pounds per square inch.
- (3) Open pressure cut-off valve slowly and fully.
- (4) Open air line valve fully.
- (5) Open fuel container valve fully.
- (6) Turn on toggle switch.
- (7) Close needle valve on air cylinder of gun.
- (8) Be sure trigger is unlocked.
- (9) Depress trigger and check ignition flame. Release trigger.
- (10) Open needle valve fully.
- (11) Depress trigger, which fires the flame thrower. Release trigger.



- (12) Depress manual blow-out lever.
- e. Set gun in safe position. After test firing:
  - (1) Lock trigger in "safe" position by turning trigger safety knob clockwise as far as it will go.
  - (2) Turn off toggle switch.

## 27. OPERATIONS PERFORMED WHEN APPROACHING TARGET.

During approach of vehicle to target, perform following operations:

- a. Turn on toggle switch.
- b. Check blow-off valve to see that it is fully closed.
- c. Grasp gun grip. Do not unlock trigger at this time.

## 28. SIGHTING AND AIMING.

- a. Sighting. There are no sights on the weapon, as all sighting is done through the periscope.
- b. Aiming. In aiming, make allowances for wind deflection. Burning fuel in flight toward target (because of its low velocity) deflects with crosswinds.

## 29. FIRING.

After vehicle has approached as near as possible to the target, and weapon has been carefully aimed:

- a. Unlock trigger by turning trigger safety knob.
- b. Pull trigger all the way to the rear; this fires the flame thrower.
- c. Using short bursts, adjust fire by traversing, elevating, or depressing until flame is on the target.
- d. To cease fire, release trigger.
- e. After each burst, depress blow-out lever to clear gun of fuel and to extinguish flame in flame shield.

CAUTION: Do not attempt to fire unignited bursts as this may cause fouling of the ignition system.

## 30. OPERATIONS PERFORMED AFTER FIRING.

- a. If almost all fuel has been expended in one of the fuel groups, and the gun is connected to that unit, carry out following procedure:
  - (1) Close pressure container valve.
  - (2) Depress trigger and fire remaining fuel from the fuel container.
  - (3) Close all remaining valves and lock trigger in "safe" position.
  - (4) Turn off the toggle switch.
- b. If most of the fuel has not been expended, and if gun is not to be disconnected from fuel group, depress blow-out lever to clear gun, and lock trigger in "safe" position.
- c. After vehicle has completed a mission, close all valves and perform all after-operation services prescribed in paragraph 46.

## **Section VIII. OPERATION OF AUXILIARY EQUIPMENT.**

### **31. GENERAL.**

No auxiliary equipment is used with the M3-4-E6R3 mechanized flame thrower other than fuel filling equipment and pressure charging equipment as explained in part four of this Technical Manual.

## **Section IX. OPERATION UNDER UNUSUAL CONDITIONS.**

### **32. WIND.**

Wind is an important factor in effective use of the flame thrower, because of the low velocity of flaming fuel. Head winds tend to shorten range and cause poor ignition, because ignition flame is blown away from fuel as fuel leaves nozzle of gun. Crosswinds tend to deflect and disperse flame and reduce range. Following winds tend to lengthen the range and increase the accuracy of the weapon.

**WARNING:** Do not fire liquid fuels into head winds of more than 5 miles per hour. Do not fire thickened fuels into head winds of more than 10 miles per hour. (Head wind speed limits are based on firing from a stationary vehicle.)

### **33. EXCESSIVE DUST.**

As far as practicable, keep flame thrower free of dust. Do not install flame gun in periscope holder until just before flame thrower mission. Clean weapon more frequently under dusty conditions.

### **34. HEAT.**

Hot climate or exposure to sun thins fuel. Thin fuel has shorter range than thickened fuel; it has a tendency to be largely consumed in air before reaching the target. If fuel is ineffective, vary the viscosity until a satisfactory mixture is obtained.

### **35. COLD.**

The weapon may be used at temperatures as low as minus 20° F., and lubrication requirements are the same as for other temperatures.

**36. WET CONDITIONS.**

When operating weapon during extremely wet or damp weather, observe the following precautions:

- a. Fuel. Do not allow water to enter fuel or fuel ingredients.
- b. Flame thrower. If gun becomes soaked or submerged in water:
  - (1) Dry and clean gun thoroughly.
  - (2) Lubricate (sec. XIII).
  - (3) Before firing, test spark, ignition flame, and main flame.

## **Section X. DEMOLITION TO PREVENT ENEMY USE.**

**37. GENERAL.**

a. Destruction of materiel when subject to capture or abandonment in the combat zone will be undertaken by the using arm only when, in the judgment of the military commander concerned, such action is deemed necessary to keep materiel from reaching enemy hands.

b. Adequate destruction of the flame thrower means damaging it to such an extent that the enemy cannot restore it to usable condition in the combat zone either by repair or by cannibalization, and damaging it so thoroughly as to prevent its study and reproduction. Adequate destruction requires that:

- (1) Enough parts essential to the operation of the flame thrower be damaged.
- (2) Parts must be damaged beyond repair in the combat zone.
- (3) The same parts must be destroyed on all materiel, so the enemy cannot make up one operating unit by assembling parts from several partly destroyed units.

**38. SPECIFIC DEMOLITION PROCEDURES.**

a. Flame gun. Strike with ax, sledge, or other heavy instrument to smash the housing, crush the barrel, and destroy valves and gun grip.

b. Fuel groups. (1) Strike with ax, sledge, or other heavy instrument to smash gages, valves, pressure lines, and pressure regulator.

(2) Fire several small arms bullets through pressure and fuel containers to render them temporarily useless.

(3) Tie detonator and 1-pound block of TNT or equivalent to pressure container, pressure line plate, and fuel container and detonate.

c. Service kit E9. Smash larger parts with ax, sledge, or other heavy instrument. Scatter smaller parts.

d. Filling and charging apparatus. (1) Destroy hose, manifold block, and valves by ax, sledge, or other heavy instrument.

(2) Render large pressure cylinders useless by releasing contents,

and destroy valves by blows with an ax or sledge.

(3) Stack charged or empty cylinders like cordwood (in groups of five to a stack) and demolish by detonating four 1/2-pound blocks of TNT.

e. Fuel. Burn.

f. Fuel thickener. Break open cans of thickener; throw their contents into a fire or a body of water.

## PART THREE

# MAINTENANCE INSTRUCTIONS

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### Section XI. GENERAL.

#### 39. SCOPE.

Part three contains information for the guidance of personnel of using organizations responsible for first and second echelon maintenance of this equipment. It contains information needed for the performance of the scheduled lubrication and preventive maintenance services, as well as a description of the major systems and units and their functions in relation to other components of the equipment.

### Section XII. SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT.

#### 40. GENERAL.

The following special organizational tools and equipment are issued to the using arm for performance of maintenance services, fuel filling, and pressure charging of the weapon. Authority and all information for ordering spare parts are given in Army Service Forces Catalogs, and these supply catalogs should always be used in requisitioning. Chemical Warfare Service nomenclature given in this manual is for information and guidance only.

a. The service kit, mechanized flame thrower, E9 is issued for use with each three flame throwers. Contents of kit are listed below.

## TOOLS

<u>Quantity</u>	<u>Nomenclature</u>
1	FILE, American Std., mill, second-cut, 10"
1	PLIERS, combination, slip-joint, wire-cutting, 6"
1	ROLL, tool (less contents)
1	SCREWDRIVER, common, normal-duty, 6" blade
1	SCREWDRIVER, common, heavy-duty, integral handle, 10" blade
1	SCREWDRIVER, off-set, double-end, 1/4" blade x 4" over-all
1	SCREWDRIVER, off-set, double-end, 3/8" blade x 6" over-all
1	TOOL, inserting, control valve
12	WIRE, clean-out, atomizer (No. 2 music wire by 12" long)
2	WRENCH, adjustable, crescent-type, single-end, 4"
1	WRENCH, adjustable, crescent-type, single-end, 8"
1	WRENCH, box (5/8" hex.)
1	WRENCH, engineer's, 15°, single-head, thin, 5/8"
1	WRENCH, pipe, adjustable, normal-duty, 14"
2	WRENCH, socket hd. screw, 1/16" hex. (for No. 5 and No. 6 set screws)
2	WRENCH, socket hd. screw, 5/64" hex. (for No. 8 set screw)
2	WRENCH, socket hd. screw, 3/32" hex. (for No. 10 set screw)
2	WRENCH, socket hd. screw, 1/8" hex. (for 1/4" set screw)
4	WRENCH, socket hd. screw, 5/32" hex. (for 5/16" set screw)
2	WRENCH, socket hd. screw, 3/16" hex. (for 3/8" set screw)
2	WRENCH, socket hd. screw, 7/32" hex. (for 7/16" set screw)
1	WRENCH, socket, spring retainer, 3/4"
1	WRENCH, socket, spring retainer, 1"
2	WRENCH, spanner (for discharge valve plunger spring retainer)
2	WRENCH, spanner (for spark plug nut and fuel nozzle)
2	WRENCH, spanner (for discharge valve plunger and gasoline housing filter)

## ACCESSORIES

<u>Quantity</u>	<u>Nomenclature</u>
4	ADAPTER, pressure regulator
3	CHAMOIS
	COMPOUND, gasket
1	CONNECTOR, brass, 1/4" - 18 NPT x 9/16" - 18 RH thread
1	COUPLING, brass, 1/4" - 18 NPT x 9/16" - 18 RH thread
1	FUNNEL, tinned iron, 3-5/8" diam. x 5/16" maximum spout size
1	FUNNEL, (12" diam.)
1	GAGE, pressure, 0-600 pound, 2-1/2" diam. dial, 1/4" male NPT connection
1	HOSE, charging line
1	LINE, charging, pressure cylinder, assembly
1	LINE, filling, pressure cylinder, assembly (portable manifold type)

b. The kit, fuel filling, flame thrower, E6 (M10) is issued for use in accordance with T/O & E. Contents of the kit and instructions for its use are described in TB CW 18. (Technical Bulletins are to be superseded by appropriate War Department Technical Manuals or changes to manuals.)

### Section XIII. LUBRICATION.

#### 41. LUBRICATION ORDER.

a. War Department Lubrication Order No. 3-U3 (fig. 52) prescribes first and second echelon lubrication maintenance.

b. A lubrication order is issued with each flame thrower and is to be kept with it at all times. If materiel is received without an order, requisition an order immediately (FM 21-6).

c. Lubrication instructions on the order are binding on all echelons of maintenance, and there will be no deviations from these instructions.

WAR DEPARTMENT LUBRICATION ORDER

LO 3-U3

1 JUNE 1945

GUN, MECHANIZED FLAME THROWER, E6R3

References: TM 3-364

Intervals given are based on firing of 10 fuel charges or less per week. Reduce intervals to compensate for greater activity. Intervals may be extended during inactive periods.

Clean parts with SOLVENT, dry cleaning, or with OIL, fuel, Diesel. Dry before lubricating.

Lubricant • Interval

Coupling Locking Pins PS W

Pump Plunger Rod PS W

Leather Cup Washer PS M  
(Remove pump plunger and apply 10 drops to cup washer)

Control Levers PS W

Valve Stems PS W

Grip Pivot PS W

Camshaft Bearings PS W

FRONT VIEW  
(Dust Cover removed)

CAUTION DO NOT LUBRICATE SAFETY LOCK

Trigger Pivot PS W

Air Cylinder PS W  
(See Note)

Trigger Link PS W

SIDE VIEW

NOTES

AIR CYLINDER—Weekly, unlock grip and with flame thrower in inverted position apply 10 drops PS to cylinder around the piston.

KEY

LUBRICANTS (All Temperatures)	INTERVALS
PS—OIL, lubricating, preservative, special	W—Weekly M—Monthly

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained therein are mandatory and supersede all conflicting lubrication instructions dated prior to 1 June 1945.

[A.G. 300.8 ( 1 June 1945)]

By Order of the Secretary of War:  
G. C. MARSHALL,  
Chief of Staff.

Official:  
J. A. ULIO,  
Major General,  
The Adjutant General.

Requisition additional Lubrication Orders in conformance with instructions and lists in FM 21-6.

Fig. 52. Lubrication order (temporary).

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## Section XIV. PREVENTIVE MAINTENANCE SERVICES.

### 42. GENERAL.

a. Responsibility. Preventive maintenance services as prescribed by AR 850-15 are a function of using organization echelons of maintenance, and their performance is a responsibility of the commanders of such organizations.

b. Intervals. Preventive maintenance services consist of before-operation, during-operation, at-halt, after-operation, and weekly services.

c. Care. Keep the flame thrower free from dust, dirt, or other foreign material; repaint scratched or marred surfaces and keep free of rust. Use only hand pressure when operating controls of the weapon. Take care that flame gun is not dropped or allowed to strike against hard surfaces; such maltreatment may injure valves, ignition spark plug, or other parts and assemblies. Take all possible precautions to keep flame gun dry.

### 43. BEFORE-OPERATION SERVICE.

a. Purpose. Before-operation services are performed by first echelon and are designed primarily as a check to see that the weapon is in condition to carry out any mission to which it is assigned.

b. Procedures. Before-operation services include inspection (according to the procedure described below) and correction, or reporting of any deficiencies.

(1) Tampering and damage. Examine entire flame thrower to determine that no injury has been caused by tampering, sabotage, or shell fire since after-operation services were performed.

(2) Leaks. Examine flame thrower and areas inside the vehicle adjacent to flame thrower to determine that no leaks have developed in fuel system or in gasoline ignition system.

(3) External wiring. Examine to see that external wiring is in good condition and that wiring connections are secure.

(4) Controls. Inspect to see if controls are in good condition and operate properly.

(5) Discharge hose. Check to see if both safety head discharge hose extend out of vehicle.

(6) Fuel and ignition gasoline. Check to see if fuel containers are filled; add fuel if necessary. Check gasoline level in reservoir and add gasoline as required.

(7) Pressure. Open pressure container valves and observe read-

ing on high pressure line gages. Gages should read approximately 1,800 pounds per square inch pressure. Weapon may be operated with initial pressure of less than 1,800 pounds, but for maximum operating efficiency, use 1,800 pounds. Close valves after making this test.

(8) Pressure regulators. Check pressure regulators to see if they are secure and functioning properly.

(9) Ignition system. (a) Check to see if coil end terminal of spark plug cable is securely seated in coil terminal assembly.

(b) Turn on toggle switch and test ignition flame (par. 26). Have an observer stand outside the vehicle (at least 3 feet to one side of the flame shield) to see if ignition flame is satisfactory. Flame should project approximately 12 inches beyond front of flame shield.

(10) Tools. Be sure all tools furnished with each flame thrower are present, serviceable, and placed within the vehicle.

(11) Leaks. After completing above inspections and tests, inspect flame thrower and areas inside the vehicle adjacent to flame thrower to determine whether any leaks have developed during before-operation service.

#### 44. DURING-OPERATION SERVICE.

a. Observation. During movement of vehicle to or from a target, check to determine whether there are any signs of leaks, vibration of the equipment, or unusual circumstances that may indicate trouble. Watch gages constantly to see if there is any unusual behavior indicating trouble in systems to which the gages apply.

b. Procedures. During-operation services consist of observing items listed below. Correct or report minor deficiencies at earliest possible opportunity, usually at the next scheduled halt.

(1) Leaks. Observe weapon constantly to see if there are any signs of leaks in fuel system, pressure system, or gasoline ignition system. Do not tighten joints under pressure.

(2) Vibrations. Be sure there are no unusual vibrations at connections of flame thrower to vehicle, or at connections of parts or assemblies of flame thrower.

(3) Instruments. Look at all instruments frequently to see if they are indicating the correct operation of units to which they apply.

(4) Flaming fuel. During firing, observe stream of fuel to see if it has full range and is properly ignited.

(5) Controls. Observe operation of controls to see if they react properly.

#### 45. AT-HALT SERVICE.

a. Performance. At-halt services are performed by the operator (firer) of the flame thrower. These checks and inspections should be performed immediately after the vehicle has come to a scheduled halt.

b. Procedures. At-halt services consist of investigating any deficiencies noted during operation, correcting them if possible, and performing the services listed below. Deficiencies not corrected should be reported promptly to the designated authority.

(1) Leaks. Check to see if leaks have developed in pressure systems, fuel systems, or gasoline ignition system. Do not tighten joints under pressure.

(2) Gasoline pressure. Check to see if gage registers 30 pounds per square inch in gasoline reservoir. Pump to required amount, if necessary.

(3) Tightness. Check to see if all parts are secure and in serviceable condition.

(4) Spillage. Remove any spillage, using cotton waste or rags. Discard rags.

(5) Instruments. Observe readings of all gages to see if they are indicating the correct operating pressures.

#### **46. AFTER-OPERATION-SERVICE.**

a. Performance. After-operation services should be performed by first and second echelon immediately after the vehicle has returned from a mission.

b. Procedures. When performing after-operation services, correct any irregularities noticed during the mission. If irregularities cannot be corrected, report them to the responsible individual in charge. After-operation procedure is as follows:

(1) Leaks. Inspect all lines, connections, plugs, valves, and joints in the fuel, pressure, and gasoline ignition systems for evidence of leakage. Correct or report any leaks found. Do not tighten joints under pressure.

(2) External wiring. Examine wiring to see if it is in good condition and all connections secure.

(3) Controls. Inspect to see if controls are in good condition and operate properly.

(4) Discharge hose. Check discharge hose for serviceability and to see if they extend out of vehicle and are secure.

(5) Fuel and ignition gasoline. If a new mission is planned, add fuel and ignition gasoline as required.

(6) Pressure. If a new mission is contemplated, charge pressure container to approximately 1,800 pounds per square inch.

(7) Pressure regulator. Check pressure regulator to see if it is set for the correct amount of pressure needed for operation of the flame thrower.

(8) Flame shield. Remove shield and clean atomizer and fuel nozzle assemblies. Check adjustment of spark plug. Replace flame shield.

(9) Ignition system. Turn on toggle switch and check ignition flame (par. 26d).

(10) Tightness. Tighten unit mounting, assembly nuts, or cap screws, if inspection indicates necessity.

(11) Cleaning. Clean entire flame thrower; wipe any fuel spillage from weapon or interior of vehicle.

(12) Tools. Be sure all tools furnished with each flame thrower

are present, serviceable, and placed within the vehicle.

#### 47. WEEKLY SERVICE.

a. Performance. Weekly services or services after 10 missions (whichever interval occurs first) are performed by first and second echelon. If second echelon actually performs the services, the firer should be present (if the situation permits) to aid and assist in correcting irregularities noted during operation.

b. Procedure. Perform weekly (or 10-mission) service as follows:

(1) Clean weapon. Clean entire flame thrower. Repaint worn or badly damaged surfaces or apply rust-preventive to prevent corrosion.

(2) Lubricate weapon. Lubricate weapon as prescribed in section XIII.

(3) Clean gasoline reservoir filter. Remove filter plug assembly and clean. If filter is damaged or excessively dirty, replace.

(4) Inspect spark plug cable. Examine spark plug cable and terminals. Replace if defective.

(5) Inspect hose. Inspect all hose for serviceability. If cracks or breaks are visible, and leakage appears imminent, replace hose.

(6) Check and clean spark plug. Remove flame shield, clean ignition spark plug, and check for correct adjustment.

(7) Bleed pressure containers. Remove any water that may be present in pressure containers (par. 58).

(8) Tighten parts and assemblies. Check all parts and assemblies for tightness. Apply wrench pressure where needed.

(9) Clean and check tools. Clean all tools furnished with each flame thrower and check for serviceability.

(10) Test fire. Test fire the weapon. Station observers outside vehicle to check ignition flame and to observe main flame for range and type of flame.

(11) Fire all fuel. Continue to fire until all fuel and pressure are expended.

## Section XV. TROUBLE SHOOTING.

#### 48. GENERAL.

a. Introduction. This section contains information for locating and correcting troubles which may develop in the flame thrower.

b. Instruction in use of trouble shooting section. To correct trouble, it is first necessary to locate and isolate it by its symptoms. Most common troubles likely to be encountered in use of the weapon, possible causes, and possible remedies are described in paragraphs 50 through 55.

**49. PRECAUTIONS.**

Before disassembling, servicing, or repairing parts or assemblies which may be under pressure, release the pressure. Remove fuel when necessary.

**50. FUEL LEAKS.**a. Fuel line leaks.

<u>Cause</u>	<u>Remedy</u>
(1) Loose threaded connections on fuel lines.	Tighten loose connections.
(2) Defective threaded connections on fuel lines.	Repair threads or replace threaded part.
(3) Dirt or foreign matter on seats or threads.	Clean affected parts.

b. Fuel nozzle leaks.

<u>Cause</u>	<u>Remedy</u>
(1) Fuel in barrel elbow.	Depress blow-out lever.
(2) Defective discharge valve packing.	Replace valve packing (par. 95).
(3) Weak or broken discharge valve spring.	Replace valve spring (par. 95).

c. Leaks in gun hose.

<u>Cause</u>	<u>Remedy</u>
(1) Worn body of gun hose.	Replace gun hose.

d. Coupling between gun hose and fuel outlet piping leaks.

<u>Cause</u>	<u>Remedy</u>
(1) Defective or worn coupling washer.	Replace coupling washer.
(2) Defective hose nipple.	Replace gun hose.

**51. LOW PRESSURE SAFETY HEAD DIAPHRAGM RUPTURE.**a. Safety diaphragm ruptures.

<u>Cause</u>	<u>Remedy</u>
(1) Defective safety head diaphragm (disk).	Replace safety head diaphragm (par. 77).
(2) Pressure regulator adjusted at too high a pressure.	Adjust pressure regulator.
(3) Defective pressure regulator.	Replace pressure regulator assembly.
(4) Defective pressure container valve.	Report to higher echelon.

**52. IRREGULARITIES IN RANGE OF FLAMING FUEL.**

a. Stream of burning fuel issues at an angle or in a very broad stream.

<u>Cause</u>	<u>Remedy</u>
(1) Obstructed fuel nozzle.	Clean nozzle.

b. Range drops rapidly during a burst.

<u>Cause</u>	<u>Remedy</u>
(1) Pressure container valve not fully open.	Open valve all the way.
(2) Pressure cut-off valve not fully open.	Open valve all the way.
(3) Incorrect adjustment of pressure regulator.	Adjust pressure regulator.
(4) Defective pressure regulator.	Replace pressure regulator assembly.
(5) Defective discharge valve.	Disassemble valve, clean, and replace defective parts.
(6) Defective air cylinder assembly.	Replace.
(7) Defective air valve (in valve block).	Disassemble, clean, and replace defective parts.
(8) Air line valve not fully open.	Open valve all the way.

c. Range of successive bursts is shortened.

<u>Cause</u>	<u>Remedy</u>
(1) Pressure container not fully charged.	Charge pressure container to approximately 1,800 pounds per square inch.
(2) Leaks in pressure system.	Tighten connections and check condition of washers.
(3) Pressure container valve not fully opened.	Open pressure container valve all the way.
(4) Pressure cut-off valve not fully opened.	Open pressure cut-off valve all the way.
(5) Air line valve not fully opened.	Open valve all the way.

d. Range shortens with discharges of more than 30 seconds.

<u>Cause</u>	<u>Remedy</u>
(1) Dried fuel or other foreign matter in fuel lines.	Clean fuel lines, if possible, or report to higher echelon.

<u>Cause</u>	<u>Remedy</u>
(2) Incorrect adjustment of pressure regulator.	Adjust pressure regulator.
(3) Defective pressure regulator.	Replace pressure regulator assembly.
(4) Pressure container, pressure cut-off, or fuel container valves not fully opened.	Open valves all the way.
(5) Rusted interiors of parts or assemblies.	Clean, where possible, or replace affected parts.

e. Flaming fuel breaks up in flight.

<u>Cause</u>	<u>Remedy</u>
(1) Weapon fired into too strong head wind or crosswind.	Avoid firing into strong head wind or crosswind.
(2) Fuel mixture unsuitable for firing conditions.	Try a different fuel mixture.
(3) Incorrect adjustment of pressure regulator.	Adjust pressure regulator.
(4) Defective pressure regulator.	Replace pressure regulator assembly.

f. Flame thrower fails to expel all fuel from fuel container.

<u>Cause</u>	<u>Remedy</u>
(1) Pressure container not fully charged.	Charge pressure container to approximately 1,800 pounds per square inch.
(2) Water in pressure container.	Remove water through pressure container bleed valve (par. 58).

g. Flame thrower continues to expel fuel after trigger is released.

<u>Cause</u>	<u>Remedy</u>
(1) Binding of control shafts in bearings.	Readjust safety plates and end plates to remove the binding.

**53. GASOLINE LEAKS.**

a. Barrel assembly.

<u>Cause</u>	<u>Remedy</u>
(1) Loose couplings or connections.	Tight connections.



<u>Cause</u>	<u>Remedy</u>
(2) Defective gasoline nozzle assembly.	Replace.
(3) Defective gasoline reservoir.	Replace.
(4) Defective gasoline tube.	Replace.
(5) Filter plug gasket worn or missing.	Replace.

b. Gun control assembly.

<u>Cause</u>	<u>Remedy</u>
(1) Worn O-packing ring in gasoline valve.	Install new O-packing ring (par. 97).
(2) Defective gasoline valve spring.	Replace spring.
(3) Foreign matter in valve.	Remove valve, clean, and replace.
(4) Incorrect assembly or improper adjustment of gasoline valve control lever.	Assemble correctly or adjust properly (par. 96f).

**54. DISCHARGE VALVE FAILURE.**

a. Valve fails to close when trigger is released.

<u>Cause</u>	<u>Remedy</u>
(1) Dirt or foreign matter in plunger assembly.	Disassemble and clean plunger assembly.
(2) Defective or broken plunger spring.	Replace spring.
(3) Defective or broken piston.	Replace piston.
(4) Defective or broken plunger rod.	Replace rod.
(5) Defective or dirty check valve assembly in gun control group.	Clean or replace.
(6) Defective or dirty needle valve on air cylinder.	Clean or replace.

b. Valve fails to open when trigger is pulled.

<u>Cause</u>	<u>Remedy</u>
(1) Air line valve on fuel group closed.	Open valve fully.
(2) Needle valve on air cylinder closed.	Open valve.

<u>Cause</u>	<u>Remedy</u>
(3) Plunger assembly frozen.	Disassemble and clean.

**55. FAILURE OF FUEL TO IGNITE.****a. At low temperatures.**

<u>Cause</u>	<u>Remedy</u>
(1) Dead or low vehicle battery.	Recharge or replace vehicle battery.
(2) Fuel too heavy.	Use more gasoline in fuel mixing.
(3) Ignition gasoline with too high flash point.	Use gasoline with lower flash point.
(4) Spark plug incorrectly adjusted.	Adjust spark plug (par. 90).
(5) Short circuit in electrical system.	Replace wire.

**b. Gasoline fails to reach atomizer.**

<u>Cause</u>	<u>Remedy</u>
(1) Gasoline reservoir empty.	Fill gasoline reservoir.
(2) Lack of sufficient pressure in gasoline reservoir.	Pump pressure in reservoir to 30 pounds per square inch.
(3) Lack of void in gasoline reservoir.	Remove part of gasoline from reservoir.
(4) Gasoline valve fails to open.	Replace valve (par. 97).
(5) Foreign matter in tubing from reservoir to atomizer.	Clean interior of tubing or replace tubing.
(6) Gasoline reservoir filter or gasoline nozzle filter clogged or defective.	Clean or replace filters (par. 94).
(7) Defective pump.	Repair or replace pump.

**c. Spark fails or is weak.**

<u>Cause</u>	<u>Remedy</u>
(1) Toggle switch not turned on.	Turn on toggle switch.
(2) Spark plug dirty, wet, defective, or incorrectly adjusted.	Clean, dry, and adjust or replace spark plug (par. 90).
(3) Electrode dirty or defective.	Clean or replace.
(4) Loose external wiring connections.	Tighten external wiring connections.
(5) Break in the wires of gun or to vehicle battery.	Repair or replace defective wiring.

<u>Cause</u>	<u>Remedy</u>
(6) Dead vehicle battery.	Recharge or replace vehicle battery.
(7) Wrong battery terminal used.	Make connection to correct battery terminal.
(8) Electrical circuit not grounded.	Ground electrical circuit.
(9) Fuse blown in switch fuse box.	Replace fuse.
(10) Defective toggle switch.	Replace switch.
(11) Defective ignition switch.	Replace switch (par. 97).
(12) Ignition switch control lever not in adjustment.	Adjust control lever (par. 96).
(13) Defective or burned out ignition coil.	Replace coil (par. 92).
(14) Short circuit in wiring.	Locate and correct cause of short circuit.

d. Air fails to flow through barrel assembly.

<u>Cause</u>	<u>Remedy</u>
(1) Dirty or defective air nozzle assembly.	Clean or replace.
(2) Dirty or defective air tubing.	Replace barrel assembly.

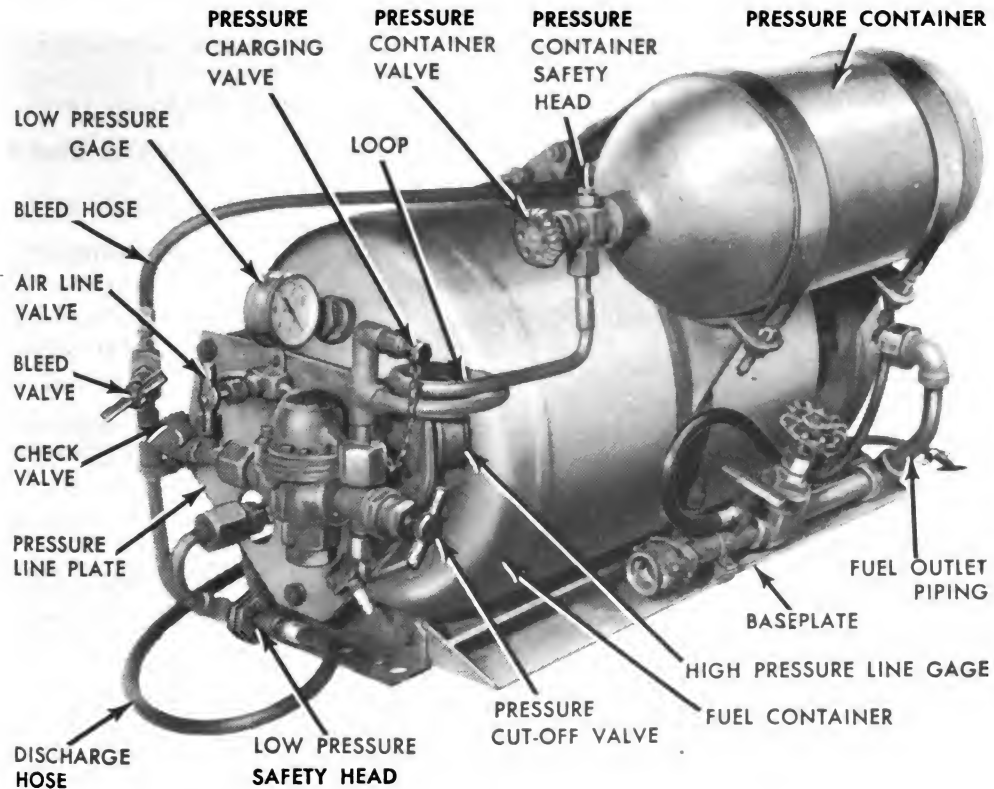
e. Atomizer fails to spray gasoline or does not spray correctly.

<u>Cause</u>	<u>Remedy</u>
(1) Atomizer clogged.	Clean atomizer with wire (par. 89).
(2) Defective atomizer body.	Replace atomizer body.
(3) Atomizer gasoline filter clogged.	Clean or replace.

## Section XVI. FUEL GROUPS.

### 56. GENERAL.

Transmission fuel group and sponson fuel group are identical, with the exception of mount and fittings in pressure system and fuel outlet piping. Containers, controls, and instruments are interchangeable, but are located in different positions because of lack of available space on sponson shelf and transmission case. For convenience in describing



the units, each unit is considered as consisting of five major components: high pressure system, pressure regulator assembly, low pressure system, fuel system, and mountings.

## Section XVII. HIGH PRESSURE SYSTEM.

### 57. GENERAL.

This system consists of the pressure container, pressure container valve, pressure container bleed valve, pressure container safety head, high pressure line gage, pressure charging valve, pressure cut-off valve, and lines and connections to connect these units.

### 58. PRESSURE CONTAINER.

a. General. The pressure container (figs. 53 and 54) is held in place by the pressure container straps. Function of the pressure container is to store and supply compressed air for operation of the flame thrower.

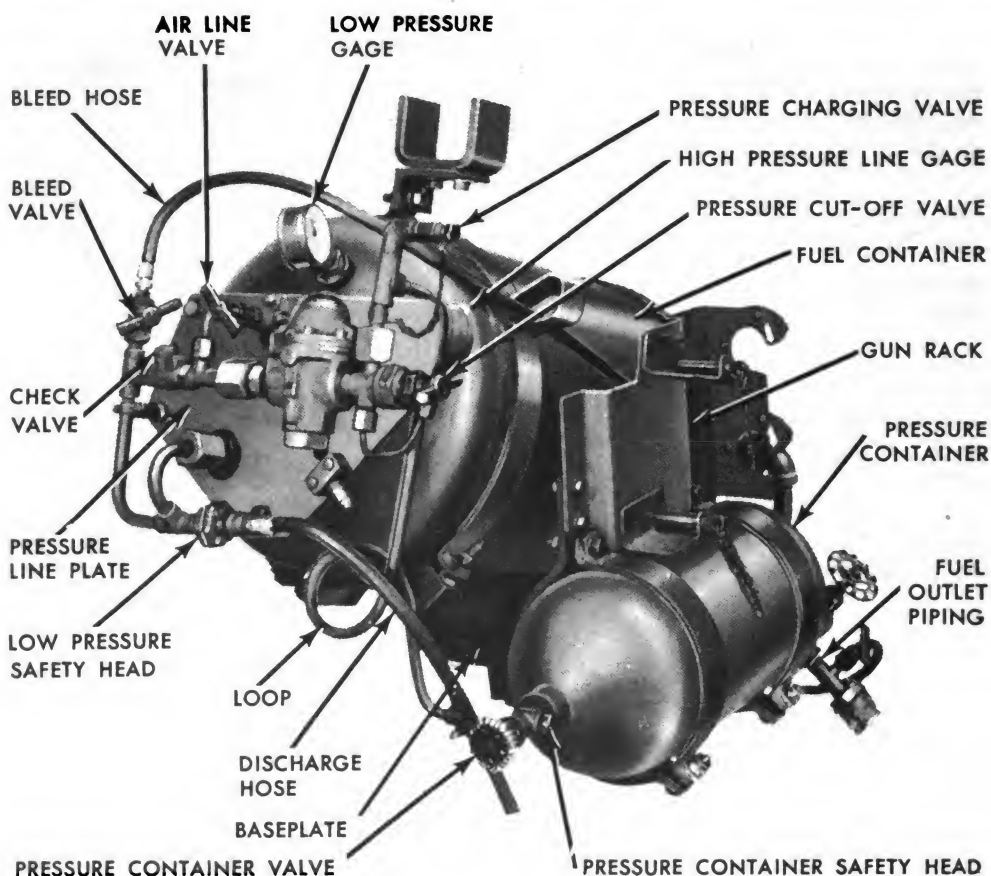


Fig. 54. Transmission fuel group.

Mounted on the pressure container are the pressure container valve, the pressure container bleed valve, and the pressure container safety head.

- b. Removal. (1) Disconnect loop from pressure container valve.
- (2) Loosen union nut connecting loop to pressure cut-off valve.
- (3) Loosen nuts holding pressure container straps in place.
- (4) Slide out pressure container.

c. Installation. To install, reverse procedure in b above.

d. Maintenance. Keep pressure container clean and free from rust or corrosion. After every 10 chargings, remove water from pressure container as follows:

- (1) Charge pressure container to approximately 50 pounds per square inch.
- (2) Open pressure container bleed valve one full turn.
- (3) Allow sufficient time for pressure to blow out water. Close valve.

## 59. PRESSURE CONTAINER VALVE.

Description and use of the pressure container valve (figs. 53 and 54)

are covered in paragraph 24. Removal or disassembly should not be attempted by first or second echelon.

#### **60. PRESSURE CONTAINER BLEED VALVE.**

a. General. This valve (figs. 23 and 37) is located at the rear of the pressure container. It is used to remove any accumulation of water in the pressure container. To open and close, use wrench on square-headed end of valve needle. Open no more than one full turn. Any water in the pressure container is emitted from the small hole on outside of the valve body. This opening in the valve must be pointed downward so that dip tube to which valve is connected can pick up water from bottom of pressure container.

b. Removal. Do not attempt to remove pressure container bleed valve from pressure container. Valve needle may be replaced by first or second echelons.

#### **61. PRESSURE CONTAINER SAFETY HEAD.**

The pressure container safety head (figs. 53 and 54) is located on the pressure container valve body. It contains a disk which ruptures automatically if pressure in pressure container exceeds safe limit, thus preventing bursting of pressure container. Do not attempt to repair pressure container safety head. If disk ruptures, replace safety head as a unit by unscrewing.

#### **62. HIGH PRESSURE LINE GAGE.**

The description and use of this gage (figs. 53 and 54) is covered in paragraph 24. Do not attempt to repair gage; if gage becomes defective, replace as a unit.

#### **63. PRESSURE CHARGING VALVE.**

a. General. This valve (figs. 53 and 54) is located on the elbow which is screwed to the top of a tee above the pressure cut-off valve. A hexagonal cap is screwed on the end of the valve body and held to the high pressure line by a chain. During charging, charging line is screwed to this valve to permit entrance of compressed air into pressure container. This valve, similar to automobile tire tube valve, allows compressed air to enter, but prevents it from leaving. Keep valve cap tight on body of valve except during charging operation. Tighten cap with wrench.

b. Removal. Unscrew valve from elbow on high pressure line and lift off the valve.

c. Installation. Screw valve to elbow on high pressure line. Tighten with wrench.

d. Disassembly. (1) Remove snap ring.

(2) Remove check valve pins.

(3) Separate parts of valve (fig. 55).

e. Assembly. (1) Replace parts in order shown in figure 55.

(2) Insert check valve.

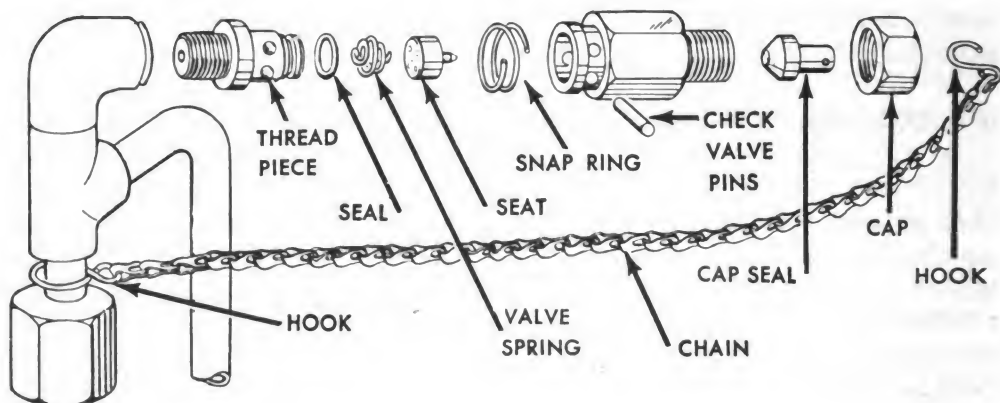


Fig. 55. Exploded view of pressure charging valve.

(3) Replace snap ring.

**WARNING:** Do not allow grease, oil, gasoline or other combustible liquids to collect on valve. Keep valve free from dust and dirt.

#### 64. PRESSURE CUT-OFF VALVE.

The pressure cut-off valve (figs. 53 and 54) controls the flow of pressure from the pressure container to the pressure regulator. During charging of pressure container, this valve prevents high pressure from entering pressure regulator, and at the same time (through a bypass in the valve) allows air to register on the high pressure line gage. Use and a short description of the valve are given in paragraph 24. Do not attempt to disassemble valve or remove from connection to pressure regulator. This valve is a part of the pressure regulator assembly and is replaced as a part of this assembly.

## Section XVIII. PRESSURE REGULATOR ASSEMBLY.

#### 65. PRESSURE REGULATOR ASSEMBLY.

**a. General.** Pressure regulator assemblies of the two units are identical. The assembly consists of the pressure cut-off valve, pressure regulator, and fittings.

**b. Removal.** (1) Remove hex nut from union of high pressure line and pressure cut-off valve (directly above pressure cut-off valve).

(2) Disconnect coupling between pressure cut-off valve and high pressure line gage tube.



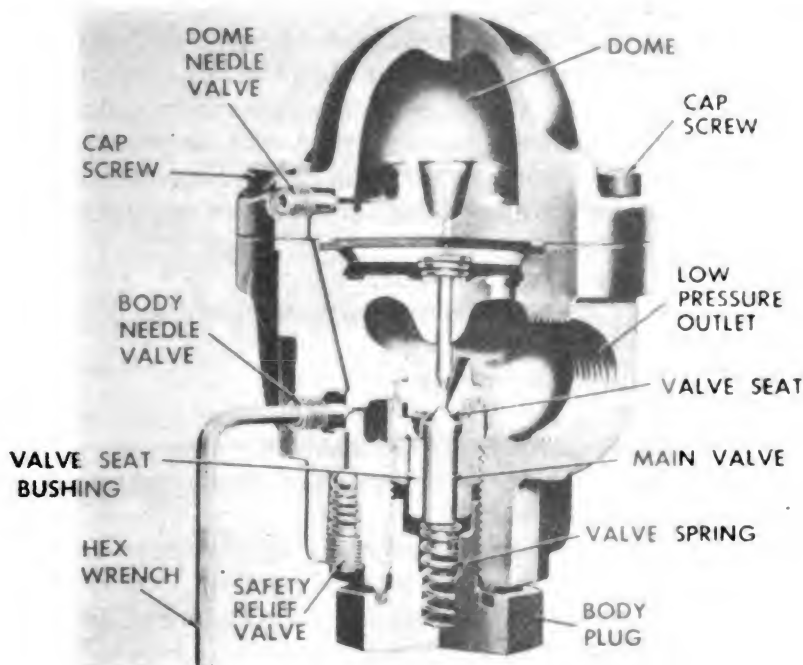


Fig. 56. Cutaway view of pressure regulator.

(3) Disconnect coupling between pressure regulator and low pressure line.

(4) Lift off pressure regulator assembly.

c. Installation. To install, reverse procedure in b above. Make sure all connections are pressure tight. Replace washers when necessary.

d. Maintenance. Do not attempt to disassemble pressure regulator assembly. Connections between pressure regulator and pressure cut-off valve are lead soldered and must not be broken by first or second echelon.

## 66. PRESSURE REGULATOR.

When properly adjusted, the pressure regulator (fig. 56) automatically reduces the pressure of approximately 1,800 pounds per square inch (in pressure container) to pressure of 370 to 380 pounds per square inch, which is required to propel fuel from weapon and operate weapon. The regulator is the dome type, with the diaphragm governing internal opening and keeping outlet pressure constant. The diaphragm is air loaded (rather than spring loaded or weight loaded). The pressure regulator is installed between the high and low pressure system. Removal of the pressure regulator from the pressure regulator assembly should not be attempted by first or second echelon. If pressure regulator becomes defective, replace pressure regulator assembly as a unit.

**67. WHEN TO ADJUST REGULATORS.**

Correct adjustment of the pressure regulator is required for maximum efficiency of the flame thrower. Frequent observation of the low pressure gage is necessary to determine when the pressure regulator needs adjustment. New flame throwers are received without pressure in the dome of the pressure regulator. Adjustment of the regulator is necessary before the weapon can be used. Adjust pressure regulator in each of the following circumstances:

- a. Upon receipt of new flame thrower.
- b. When low pressure gage shows a reading of less than 370 or more than 380 pounds per square inch.
- c. If safety head diaphragm breaks.

**68. PRECAUTIONS WHEN ADJUSTING REGULATOR.**

- a. Do not apply excessive force to wrenches when tightening dome needle valve and body needle valve.
- b. Use only finger pressure on wrenches, as excessive force may cause serious injury to needle valves and valve seats.
- c. Use correct size socket head wrenches (supplied with flame thrower) to turn dome and body needle valves.

**69. STEPS PREPARATORY TO ADJUSTMENT.**

Before attempting adjustment of the pressure regulator, perform the following procedure:

- a. If the pressure tank is not fully charged, recharge to a pressure of approximately 1,800 pounds per square inch.
- b. Check to make sure fuel container is filled with fuel. Add fuel as required.
- c. Make sure pressure cut-off and pressure container valves are closed.
- d. Check to make sure fuel container valve is closed.
- e. Check to make sure dome and body needle valves are closed.

**70. ADJUSTMENT OF PRESSURE REGULATOR.**

a. To decrease pressure to fuel container. If low pressure gage shows a reading of more than 380 pounds per square inch or if safety head diaphragm breaks, pressure regulator is adjusted to too high a pressure or regulator is defective. To decrease pressure to fuel container, perform preparatory steps given in paragraph 69 and proceed as follows:

- (1) If safety head diaphragm has blown, replace diaphragm.
- (2) Close blow-off valve.
- (3) Close bleed valve.
- (4) Disconnect bleed hose at union with blow-off valve.
- (5) Extend free end of bleed hose out of vehicle.
- (6) Open bleed valve and allow pressure to escape from fuel container until reading on low pressure gage shows approximately 300 pounds per square inch. Close bleed valve. Replace bleed hose.

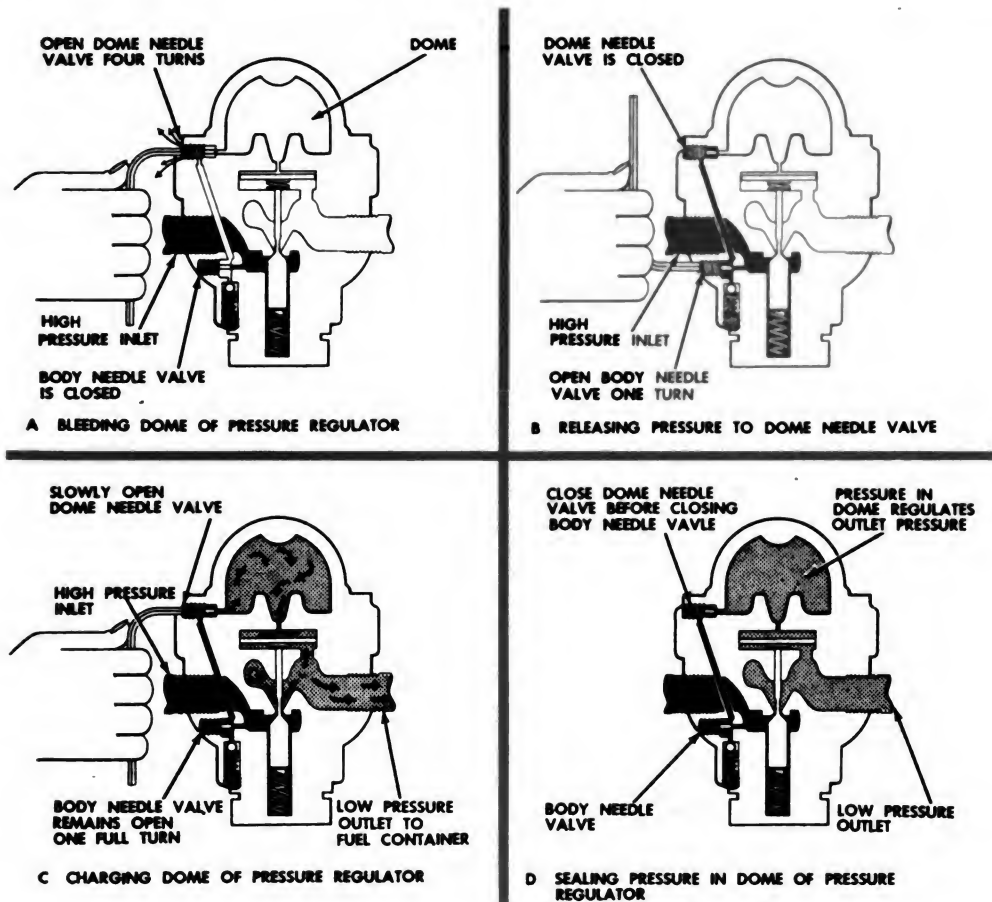


Fig. 57. Diagrammatic sketch showing adjustment of pressure regulator.

- (7) Bleed dome of regulator as follows (fig. 57):
  - Using hex wrench, open dome needle valve four complete turns.
  - Wait 1 minute for pressure to bleed out of dome of regulator.
  - Close dome needle valve (fig. 58).
- (8) Before proceeding with adjustment of pressure regulator, test regulator as follows:
  - Open pressure container valve.
  - Open pressure cut-off valve slowly and observe low pressure gage. If pressure shown on low pressure gage rises, close cut-off valve immediately.
- (9) If low pressure gage has shown a rise in pressure during testing [(8) above], proceed as follows:
  - Clean main valve and valve seat of regulator (par. 72).
  - Perform above test again, observing reading on gage. If pressure continues to rise, replace pressure regulator assembly.
- (10) If low pressure gage does not show a rise in pressure, perform the procedures in b below.

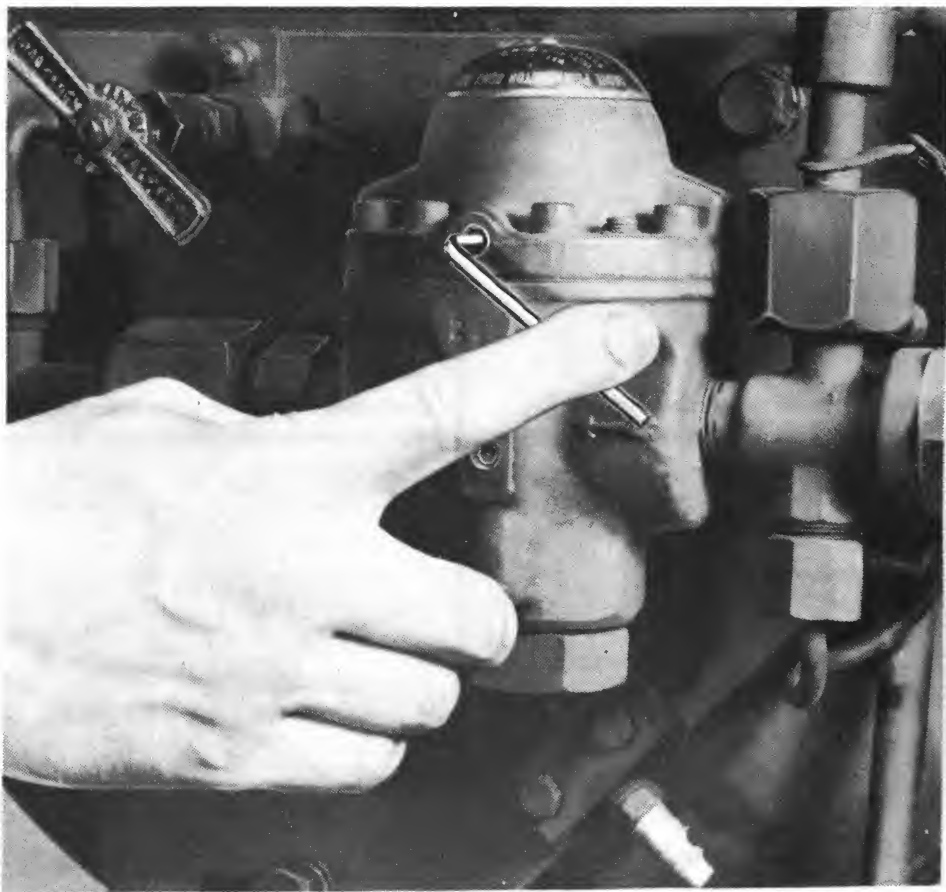


Fig. 58. Closing dome needle valve using finger pressure.

b. To increase pressure to fuel container. After preparatory steps have been performed, proceed as follows:

- (1) Open pressure container valve.
- (2) Open pressure cut-off valve.
- (3) Using hex wrench, open body needle valve one full turn (fig. 57). (Hissing sound results from leakage of air around body needle valve threads.)

(4) Open dome needle valve slowly, using hex wrench, and observe rise of pressure indicated on low pressure gage. When indicator reads between 370 and 380 pounds per square inch, close dome needle valve.

- (5) Close body needle valve (fig. 59).

(6) A safety relief valve (fig. 56) is located below dome and body needle valves to prevent excessive pressure from entering the dome during adjustment of the regulator. This relief valve is preset at the factory; do not adjust.

## **71. TESTING ADJUSTMENT OF PRESSURE REGULATOR.**

- a. Before using the weapon on a mission (after adjustment of the

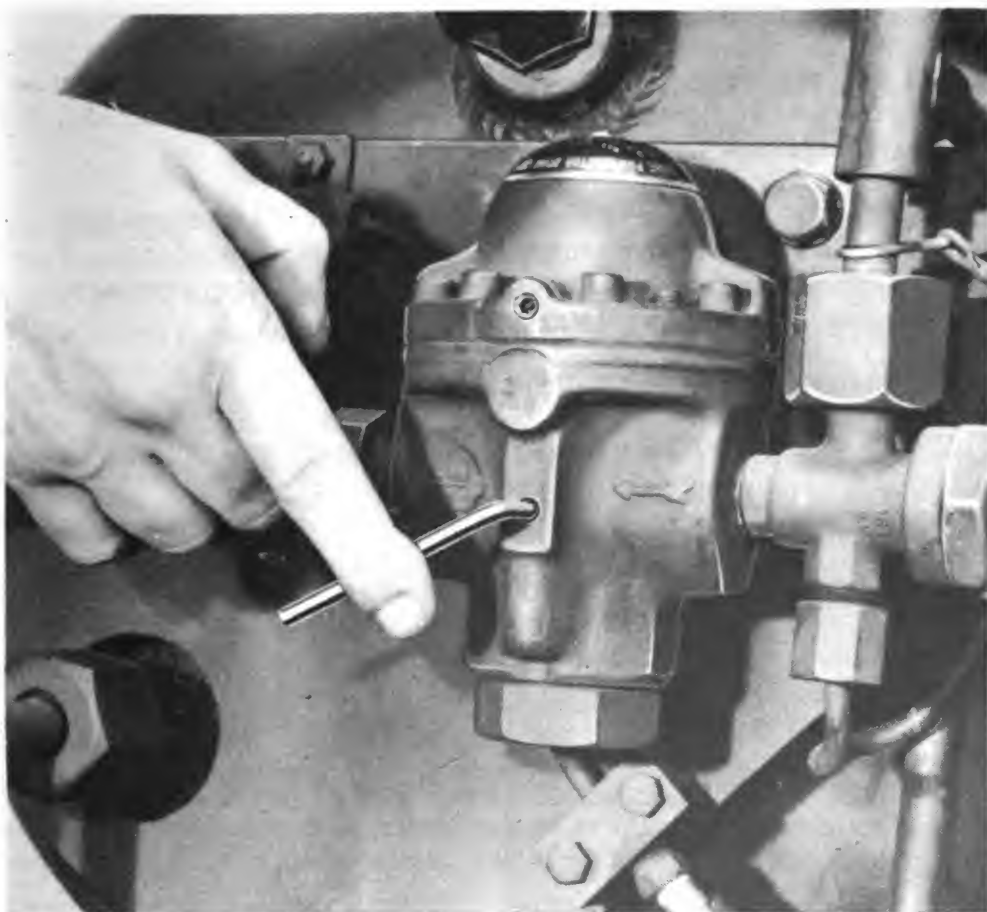


Fig. 59. Closing body needle valve.

pressure regulator), test fire with fuel (if tactical and supply conditions permit) and observe reading of low pressure gage to see that pressure of 370 to 380 pounds per square inch is maintained in the fuel container before and after burst. Low pressure gage indicates drop in pressure during actual burst. Pressure returns to normal immediately after burst. If actual test firing is not practical, test adjustment of pressure regulator as prescribed in b below.

b. To test adjustment of the pressure regulator without firing the weapon, proceed as follows:

- (1) See that bleed valve is closed.
- (2) Disconnect bleed hose at union with blow-off valve.
- (3) Extend free end of bleed hose out of vehicle.

CAUTION: Be sure pressure tank valve, pressure cut-off valve, and fuel container valve are closed.

- (4) Open bleed valve and allow pressure in fuel container to reduce to approximately 300 pounds per square inch. Close bleed valve and replace bleed hose.

- (5) Open pressure container valve.
- (6) Open pressure cut-off valve and observe reading on low pressure gage. If gage shows a reading of between 370 and 380 pounds per square inch, adjustment of pressure regulator is satisfactory, and pressure regulator is functioning correctly.

NOTE: If gage shows a reading of less than 370 or more than 380 pounds per square inch, repeat adjustment procedures. If pressure regulator cannot be adjusted to satisfactory pressure, replace pressure regulator assembly.

## 72. MAINTENANCE OF PRESSURE REGULATOR.

The pressure regulator ordinarily requires a minimum of maintenance, other than adjustment, by first and second echelon. The following maintenance is prescribed for first and second echelon:

a. Cleaning exterior. Keep exterior clean and free from rust or corrosion.

b. Tightening dome. Using hex wrench, tighten the cap screws which hold dome tight to body of regulator (fig. 56). (If cap screws work loose, compressed air usually leaks from the dome, causing a continual drop in pressure delivered to the fuel container.) Do not tighten jack screw, which is located between two of the cap screws holding dome to body of regulator.

c. Cleaning main valve and valve seat. Dirt or foreign matter lodged around main valve or main valve seat increases pressure delivered to the fuel container. If this condition is suspected, clean valve as follows:

- (1) Close pressure tank valve.
- (2) Close pressure cut-off valve.
- (3) Release all pressure from fuel container.
- (4) Using wrench, remove body plug (fig. 56).
- (5) Remove valve spring and main valve (fig. 56), being careful not to drop or damage them.
- (6) Clean main valve and valve spring with a clean dry cloth.
- (7) Insert a small piece of wood or other blunt instrument, covered with a clean dry cloth, into valve seat bushing. Clean valve seat by rotating instrument with the fingers. Be careful not to scratch or damage valve seat or washer.
- (8) Replace main valve, valve spring, and body plug.
- (9) Adjust and test pressure regulator. If low pressure gage indicates a rise in pressure after main valve and valve seat have been cleaned, replace pressure regulator assembly.

## Section XIX. LOW PRESSURE SYSTEM.

### 73. GENERAL.

The low pressure system consists of the air line valve, low pressure gage, check valve, low pressure safety head, discharge hose, bleed valve, bleed hose, and lines and connections to these units. The system is secured to the pressure line plate. The parts of the low pressure system of the two units are identical.

### 74. AIR LINE VALVE.

Description and use of the air line valve (figs. 53 and 54) are given in paragraph 24. Do not attempt to remove valve from air line assembly. If valve becomes defective, replace air line assembly.

### 75. LOW PRESSURE GAGE.

Description and use of the low pressure gage (figs. 53 and 54) are covered in paragraph 24. Repair of the gage should not be attempted by first or second echelon. If the gage becomes defective, replace gage as a unit by unscrewing from fuel container.

### 76. CHECK VALVE.

The check valve (figs. 53 and 54) is located in the low pressure line beyond the pressure regulator. This automatic valve permits passage of air to fuel container, but prevents fuel from entering pressure regulator. Repair or replacement by first or second echelon should not be attempted. If valve becomes defective, report to higher echelon.

### 77. LOW PRESSURE SAFETY HEAD.

a. General. The low pressure safety head (figs. 53 and 54) is located on a tee in the low pressure line. The safety head contains a safety diaphragm which bursts if pressure in low pressure line becomes excessive. If excessive pressure causes diaphragm to burst, pressure and a small amount of residual fuel in low pressure line are blown outside vehicle through the discharge hose.

b. Removal of safety head diaphragm. Remove the three cap screws in the safety head, separate safety head, and lift out diaphragm.

c. Installation of safety head diaphragm. Carefully insert diaphragm in safety head so that no part of domed surface is crimped, dented, or distorted. Use extreme care in handling diaphragm. Replace other portion of safety head and the three cap screws. Screw cap screws handtight as far as possible. Using wrench or screw driver, gradually screw down all three cap screws until they are equally tight. Do not tighten excessively.



**78. DISCHARGE HOSE.**

a. General. This rubber hose (figs. 53 and 54), which is fitted with threaded female ends, diverts pressure and residual fuel in low pressure line to the outside of the vehicle if the low pressure safety diaphragm ruptures. Discharge hose and bleed hose, which are identical in construction, are interchangeable.

b. Removal. Disconnect discharge hose at union with low pressure safety head.

c. Installation. Screw hex nut of discharge hose to male threaded connection at low pressure safety head.

**79. BLEED VALVE AND BLEED HOSE.**

a. Bleed valve. Description and use of the bleed valve (figs. 53 and 54) are given in paragraph 24. Removal or installation of the valve should not be attempted by first or second echelon. If valve fails to function, report to higher echelon for repair or replacement.

b. Bleed hose. Made of rubber, with threaded metal ends, the bleed hose (figs. 53 and 54) forms a pressure tight connection between bleed valve and blow-off valve. Bleed hose and discharge hose are identical in construction and are interchangeable.

(1) Removal. Remove hex nuts at union of bleed valve and blow-off valve.

(2) Installation. Install in reverse order to (1) above.

## **Section XX. FUEL SYSTEM.**

**80. GENERAL.**

Main assemblies of the fuel system are the fuel container and the fuel outlet piping. Entrance of compressed air from the low pressure system into the fuel container forces the fuel out of the container through the fuel outlet piping to the gun hose.

**81. FUEL CONTAINER.**

a. General. Made of steel, the fuel container (figs. 53 and 54) is mounted on the baseplate and held in place by the fuel container straps. Fuel capacity of container is 25 gallons. Compressed air enters the fuel container through an opening located near the top of the head. Container is filled through the fuel outlet piping.

b. Removal. See paragraphs 12 and 17.

c. Installation. See paragraphs 13 and 18.

d. Maintenance. Fuel container ordinarily requires no additional maintenance other than cleaning and painting.

CAUTION: Do not attempt to weld or solder fuel container. If defective, report to higher echelon.

## 82. FUEL OUTLET PIPING.

a. General. The fuel outlet piping (figs. 53 and 54) directs the flow of fuel from the fuel container to the gun hose. Fuel container is filled with fuel through the fuel outlet piping. The fuel container valve (located on piping) controls the flow of fuel through the piping. The remaining fuel under pressure (in gun hose and in fuel outlet piping beyond fuel container valve) is released through the blow-off valve. A coupling is provided to connect the gun hose to the fuel outlet piping.

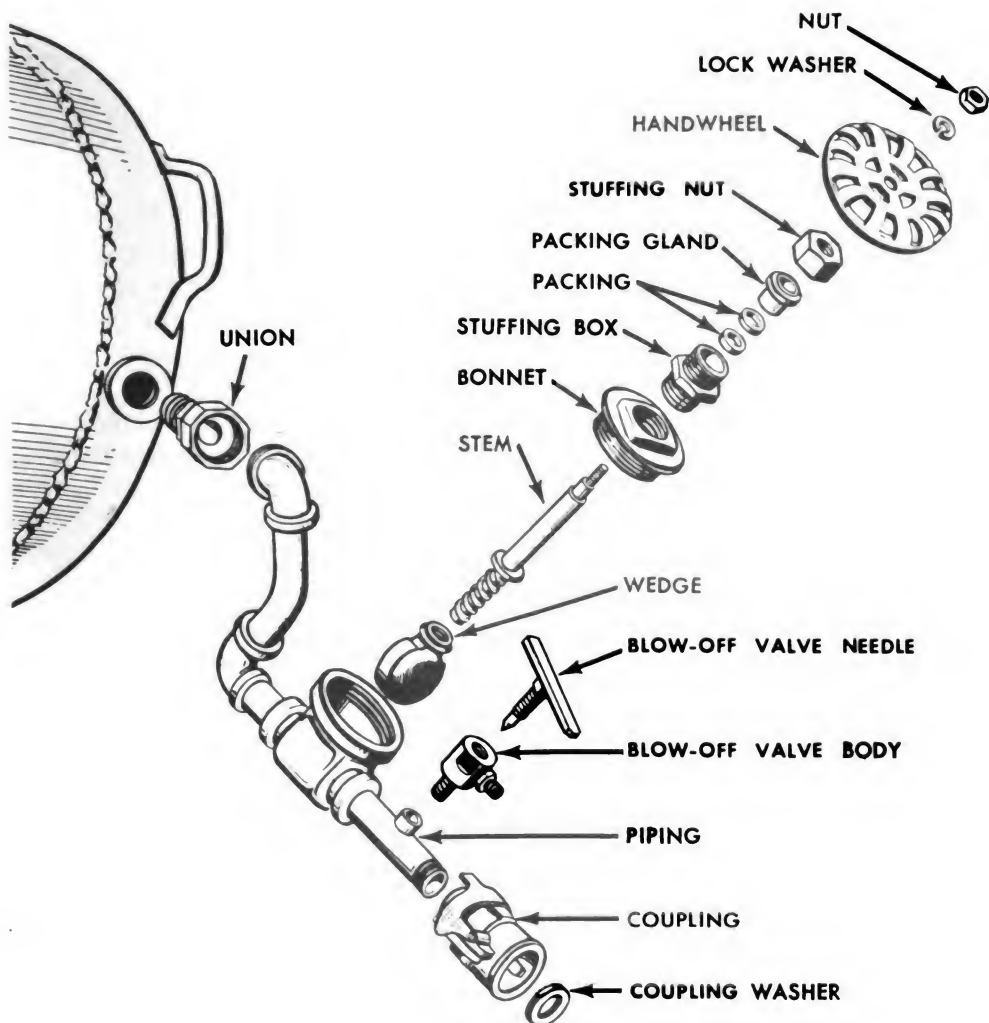


Fig. 60. Fuel outlet piping. (Exploded view of fuel container valve and blow-off valve.)

- b. Removal. See paragraphs 12 and 17.
- c. Installation. See paragraphs 13 and 18.
- d. Maintenance. (1) If fuel outlet valve becomes defective, disassemble and replace parts as necessary (fig. 60). Do not attempt to remove valve body from fuel outlet piping (connections of fuel outlet piping and fuel container valve body are lead soldered).
- (2) Do not attempt to disassemble coupling. If coupling is defective, replace coupling as a unit. Replace the synthetic rubber washer as required.
- (3) If leaks develop in blow-off valve, disassemble as shown in figure 60. Replace parts as required.

## **Section XXI. MOUNTINGS.**

### **83. BASEPLATE.**

The baseplate forms a base for the component parts of the fuel group. Baseplate of sponson group is tack welded or bolted to sponson shelf of vehicle upon installation of the flame thrower. Baseplate in transmission group is bolted to transmission case.

### **84. PRESSURE LINE PLATE AND GUN RACK.**

- a. The pressure line plate is mounted to the fuel container. This plate forms a firm base on which valves, gages, and lines are mounted.
- b. The gun rack is mounted on assistant driver's side of transmission fuel group. It is designed to hold the cal. .30 machine gun, and the E6R3 flame gun may also be stored on it.

## **Section XXII. GUN BARREL ASSEMBLY.**

### **85. GUN BARREL ASSEMBLY.**

- a. General. The gun barrel assembly (figs. 61 and 64) consists of the flame shield, barrel elbow assembly, fuel nozzle assembly, atomizer assembly, and the spark plug and connections.
- b. Removal. To remove gun barrel assembly from gun control assembly, see paragraph 23; to remove assembly from periscope holder, see paragraph 23.
- c. Installation. To install gun barrel assembly into periscope holder, see paragraph 23; to connect this assembly to the gun control assembly, see paragraph 23.

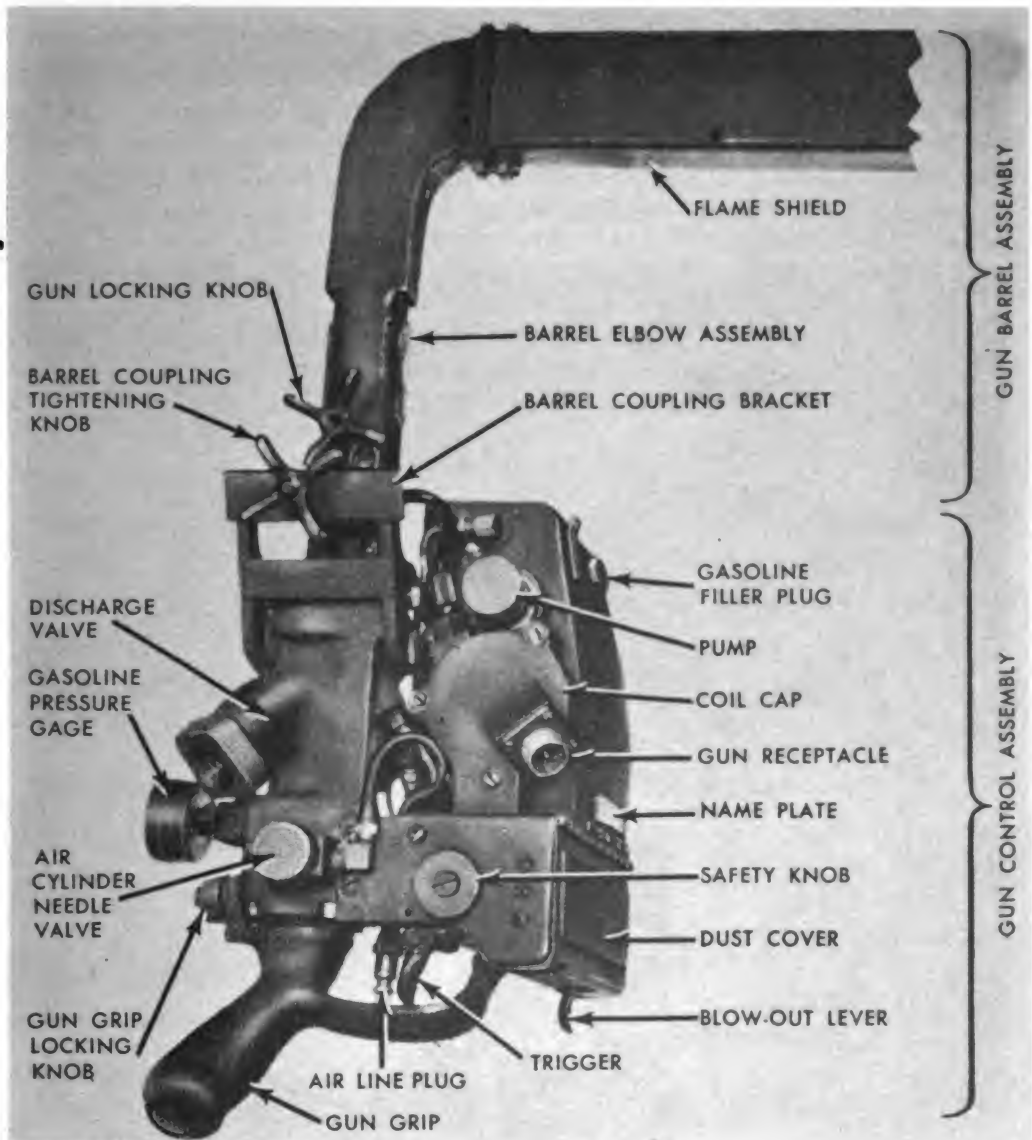


Fig. 61. Mechanized flame thrower gun E6R3.

## 86. FLAME SHIELD.

**a. General.** (1) This shield consists of a rectangular steel tube with a flange at one end. The flange has a lug on the top and bottom which is drilled to receive the cap screws. These screws engage the threads in the holes in the flange of the barrel elbow, securing the shield to the barrel elbow. A gasket is located between the two flanges. At various points on the shield, holes are drilled which serve to supply air to the ignition flame. The shield protects front of gun and also prevents wind from extinguishing ignition flame.

**b. Removal and installation.** (1) To remove the shield from the barrel assembly, remove the two cap screws in the flange, using a socket head wrench (fig. 62), and slide off the shield and gasket.

(2) To install the shield, reverse procedure in (1) above.

**87. BARREL ELBOW ASSEMBLY.**

a. General. This assembly (fig. 61) consists of a fuel tube protected by a steel housing. In addition to the fuel tube, the housing contains the air and gasoline lines and the spark plug cable. At the nozzle end of the barrel elbow is a flange with two lugs which is used in making the connection to the flame shield. At the lower portion of the barrel el-

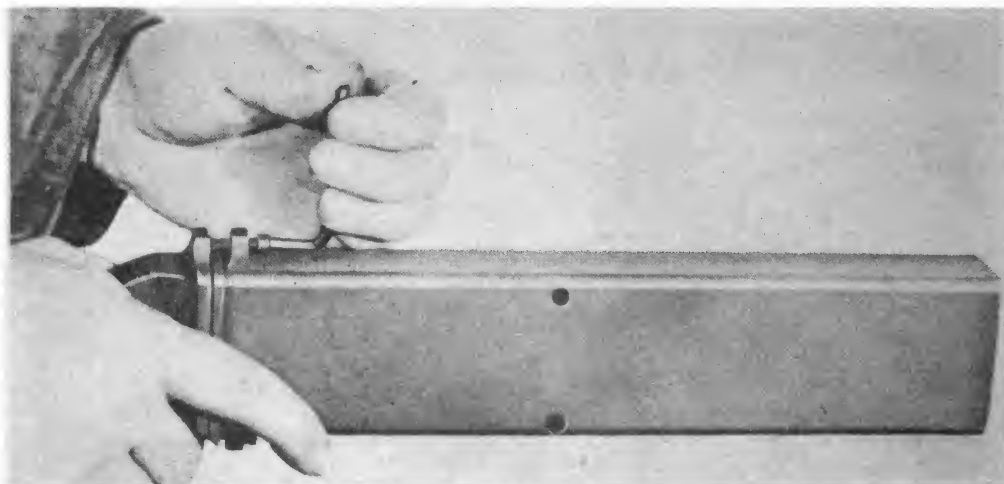


Fig. 62. Removing cap screws preparatory to removal of flame shield.

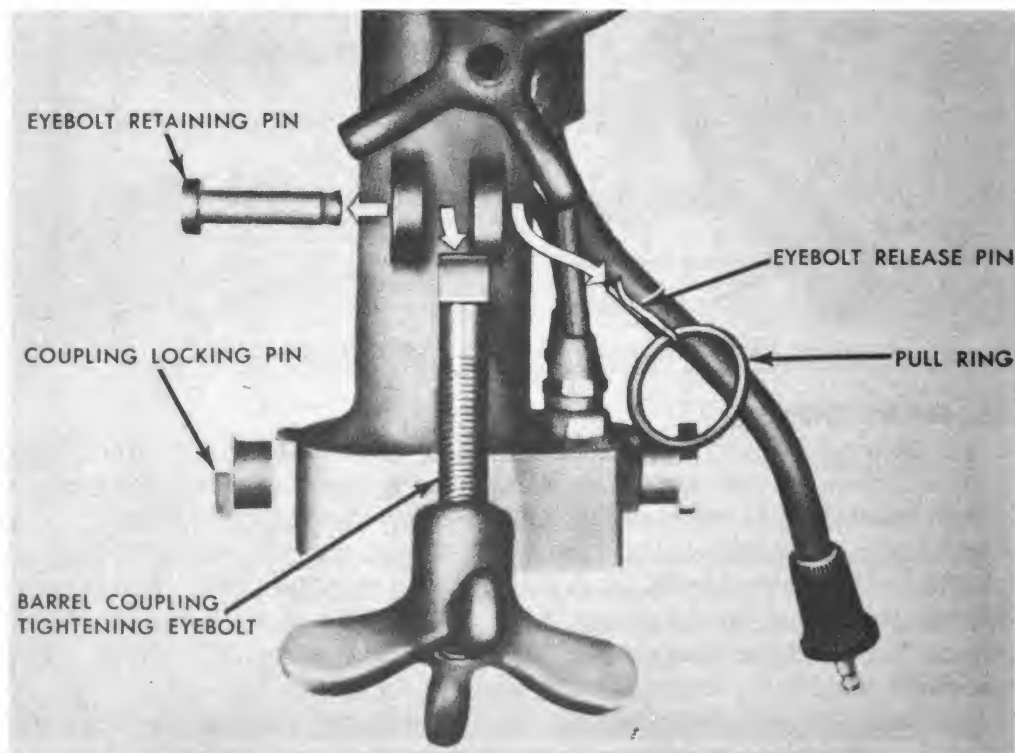


Fig. 63. Exploded view of barrel coupling tightening eyebolt assembly.

bow is located the barrel mounting bolt, the barrel coupling eyebolt assembly, and the barrel locking pins.

b. Removal of barrel coupling tightening eyebolt (fig. 63). (1) To remove eyebolt, separate eyebolt from the retaining pin by grasping pull-ring on the release pin (cotter pin). With a sharp pull, remove the release pin. Push out the retaining pin and lift out the eyebolt.

(2) To install the eyebolt, reverse procedure for removal described in (1) above.

### 88. FUEL NOZZLE ASSEMBLY.

a. General. The fuel nozzle assembly (fig. 64) consists of the fuel nozzle body and the fuel nozzle. The fuel nozzle body is a stainless

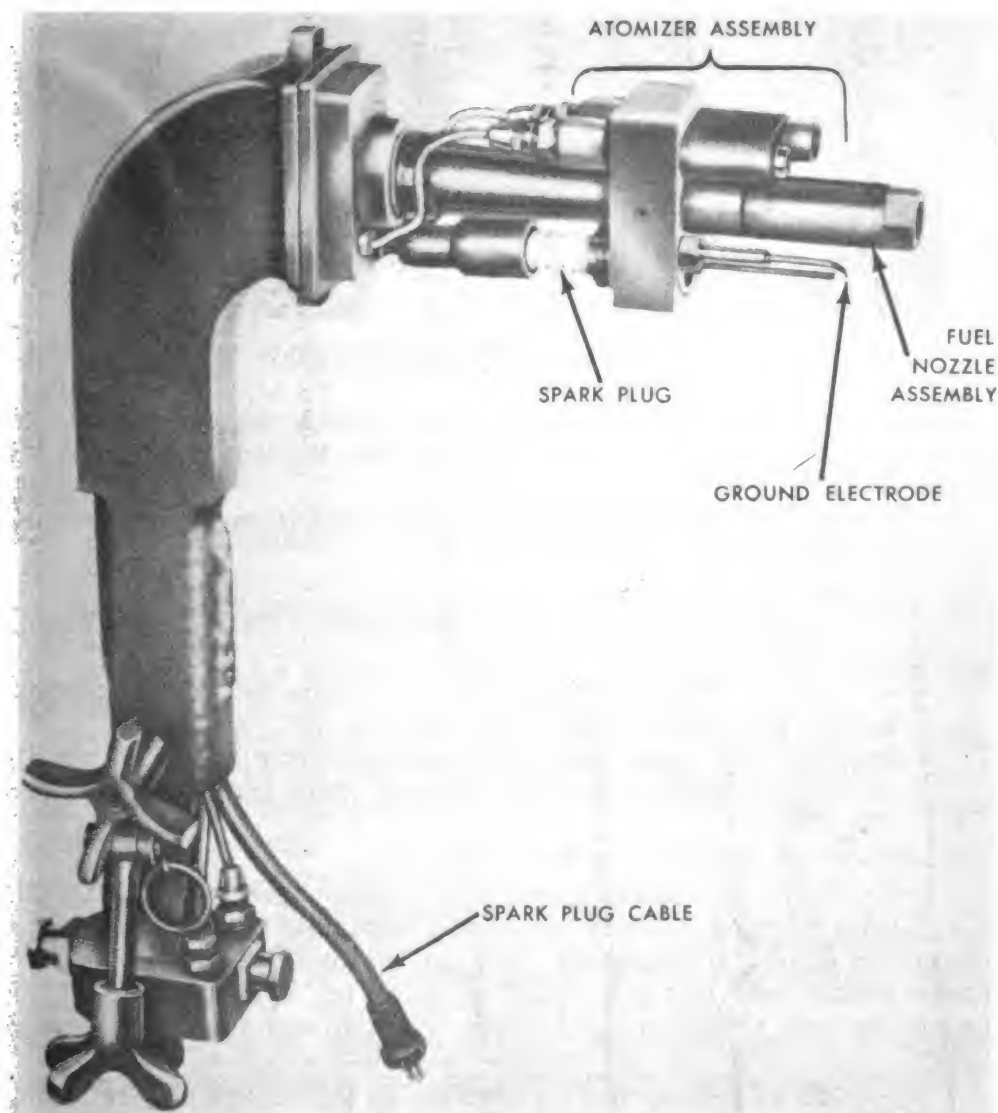


Fig. 64. Barrel assembly with flame shield removed.

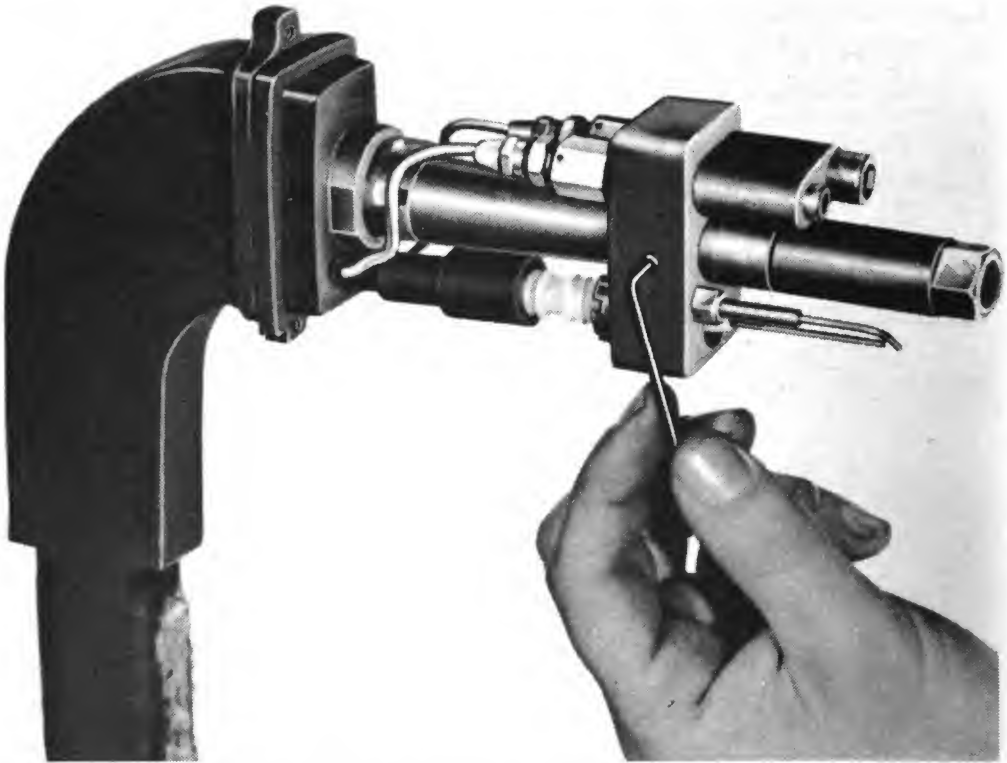


Fig. 65. Loosening atomizer mounting plate set screw.

steel tube which screws into the fuel tube outlet in the upper portion of the barrel elbow. The fuel nozzle screws into the other end of the fuel nozzle body.

**b. Removal.** Fuel nozzle assembly is removed from barrel assembly in the following manner:

- Remove flame shield.
- Loosen the set screw located on each side of the atomizer mounting plate (fig. 65).
- Disconnect air and gasoline tube nuts from the air and gasoline nozzle assemblies, using a wrench (fig. 66).
- Separate the spark plug lead terminal from the spark plug by pulling the spark plug cable terminal away from the spark plug (fig. 67).
- Slide off atomizer assembly (fig. 68).
- Unscrew fuel nozzle assembly, using spanner wrench (fig. 69).

**c. Installation.** (1) Screw fuel nozzle assembly into its mounting on the barrel elbow. If the nozzle body and the fuel nozzle are separate, screw nozzle body into the mounting, using the spanner wrench, and screw the fuel nozzle into the body. Tighten sufficiently to prevent leaks.

(2) Slide on the atomizer assembly so that spark plug is in line with the spark plug lead, and the gasoline and air tube nuts can be connected to the air and gasoline nozzle assemblies.



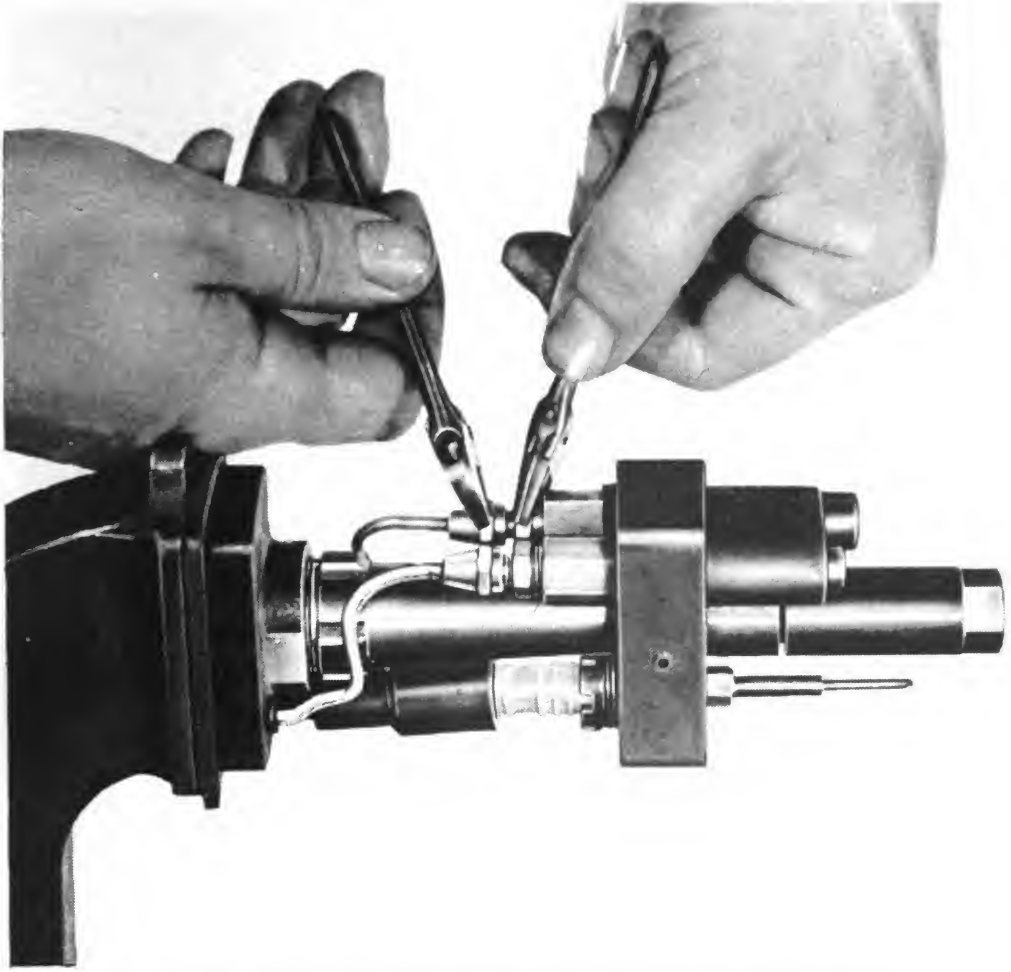


Fig. 66. Disconnecting tube nuts on nozzle assembly.

(3) Connect gasoline and air tube nuts to air and gasoline nozzle assemblies.

(4) Tighten set screws on side of mounting plate with socket head wrench.

(5) Connect spark plug lead terminal to the spark plug by sliding the connector in the terminal over the spark plug until a click is heard. It is important that this click be heard because it signifies a proper connection.

(6) Replace barrel shield.

d. Disassembly. Fuel nozzle can be separated from the nozzle body without removing the atomizer assembly. To do this, unscrew fuel nozzle from nozzle body by holding nozzle body with the spanner wrench and unscrewing fuel nozzle with adjustable wrench.

e. Adjusting range, using fuel nozzle. The range of the flamethrower can be varied, within limits, by varying the size of the fuel nozzle. Three sizes of nozzles are supplied with the gun-- $3/8$ ,  $5/16$ , and  $7/16$  inch (inside diameter). The  $3/8$ -inch nozzle gives best results with

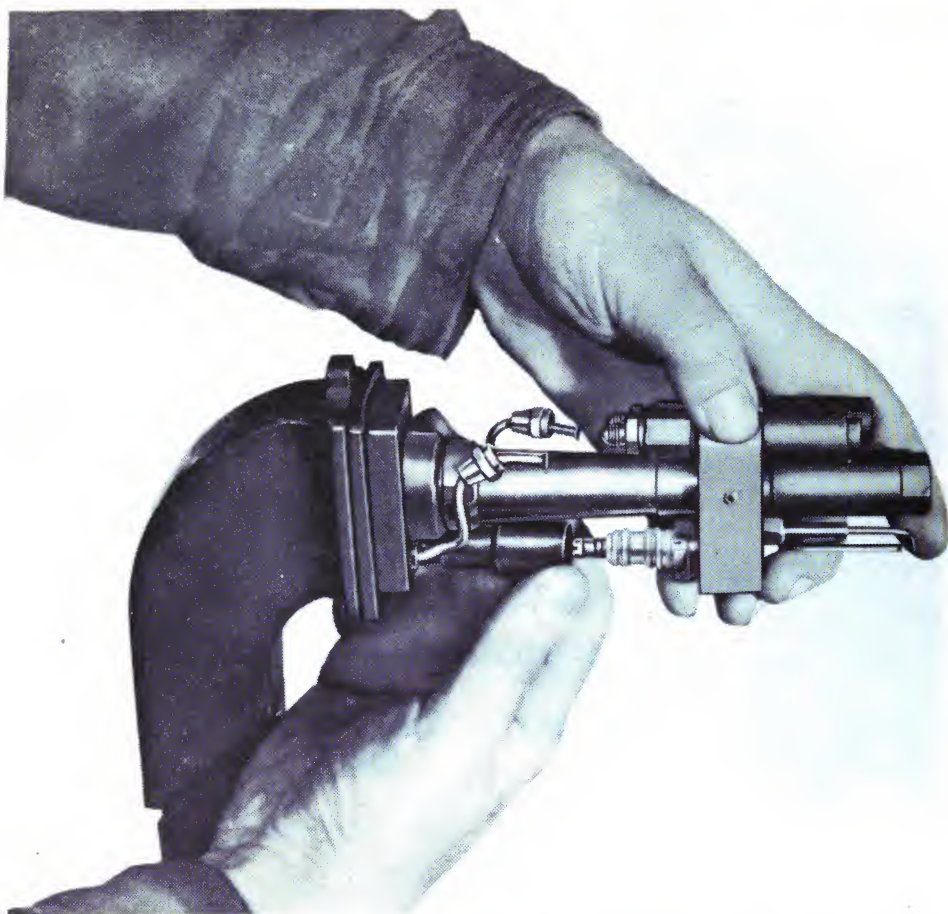


Fig. 67. Pulling spark plug cable terminal away from spark plug.

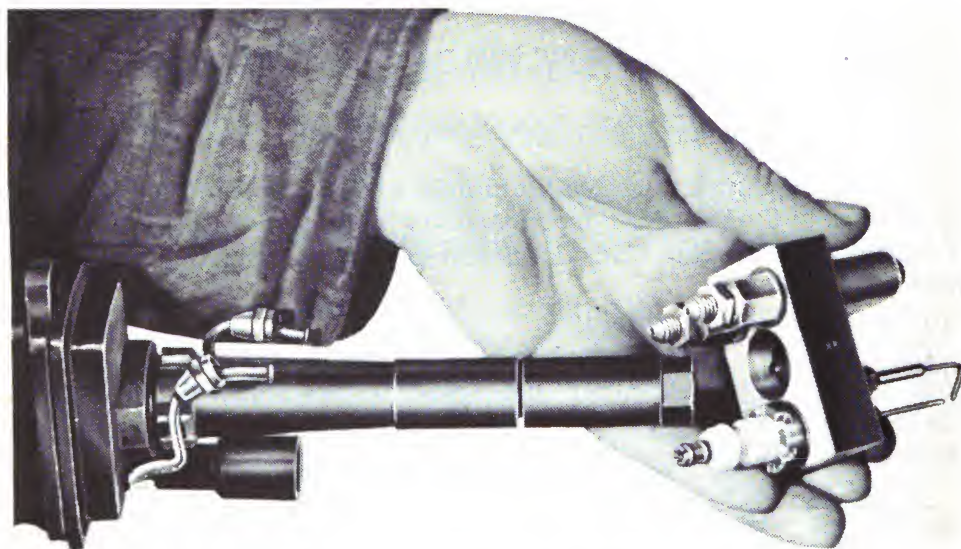


Fig. 68. Removing atomizer assembly from fuel nozzle assembly.



Fig. 69. Unscrewing fuel nozzle assembly using special spanner wrench.

thickened fuel; the 7/16-inch nozzle gives greater volume than the 3/8-inch but less range.

f. Maintenance. Clean nozzle after each mission by removing flame shield and unscrewing nozzle from body. Wash in cleaning solvent, dry, and replace.

#### **89. ATOMIZER ASSEMBLY (figs. 70 and 71).**

a. Components. The atomizer assembly, which consists of the atomizer mounting plate, atomizer body, and the air and gasoline nozzle assemblies, is mounted on the fuel nozzle assembly (fig. 64).

(1) Atomizer mounting plate. The atomizer mounting plate is a stainless steel unit which supports the atomizer, nozzle assemblies, spark plug, and the electrode. In addition, it serves to provide support for the flame shield.

(2) Atomizer body. The atomizer body is a bronze unit which serves to spray air and gasoline from the air and gasoline nozzle assemblies. It is tapped to receive the air and gasoline nozzle assem-

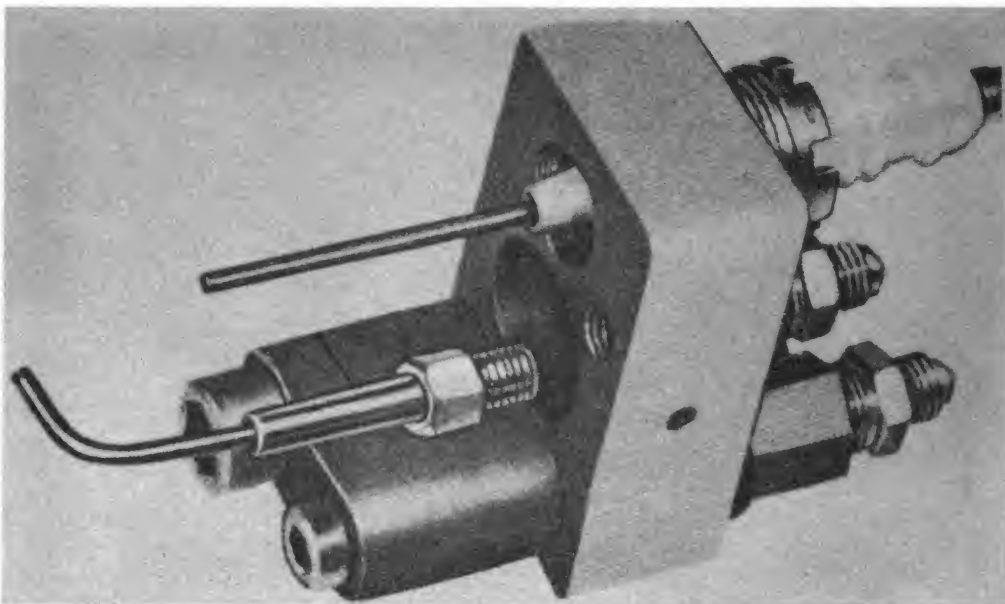


Fig. 70. Atomizer, nozzle, spark plug, and ground electrode on atomizer mounting plate.

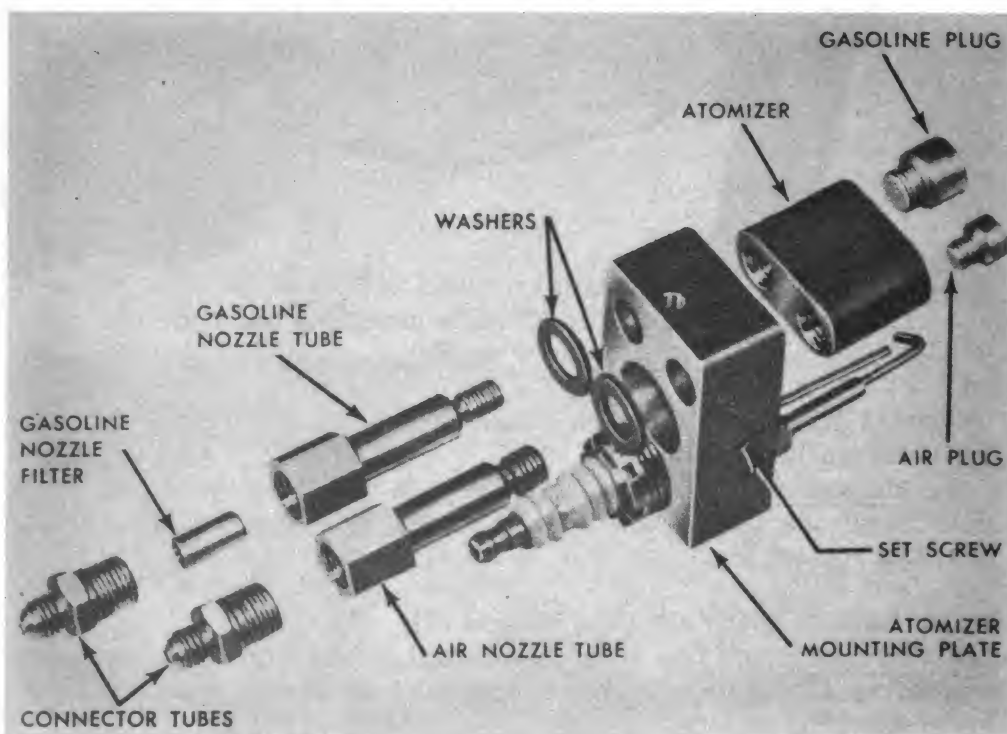


Fig. 71. Exploded view of atomizer assembly.

blies, which also secure the atomizer to the atomizer mounting plate.

(3) Air and gasoline nozzle assemblies. The nozzle assemblies are used to regulate the flow of gasoline and air to the atomizer. The air nozzle assembly can be identified by the cadmium plating; the gasoline nozzle assembly is identified by the bronze coating. The gasoline



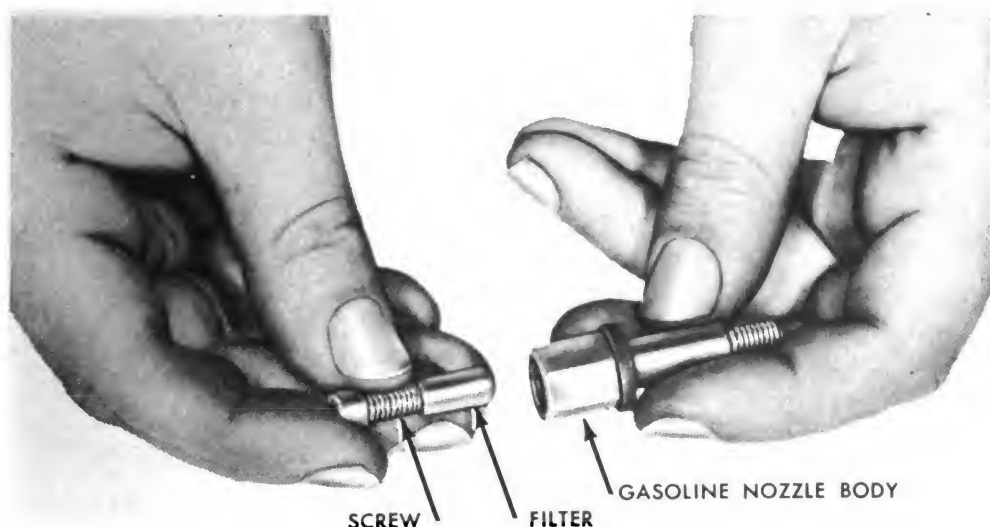


Fig. 72. Filter removed from gasoline nozzle body.

nozzle assembly contains a filter for removing any foreign matter which may pass through the gasoline system.

b. Removal and installation. (1) To remove atomizer assembly from fuel nozzle assembly, use procedure described in paragraph 88b.

(2) To install atomizer assembly on fuel nozzle assembly, see paragraph 88c.

c. Disassembly. (1) Air and gasoline nozzle assemblies. Separate air and gasoline nozzle assemblies from mounting plate and atomizer body by unscrewing them with a wrench. The nozzles are unscrewed from the nozzle assemblies with a wrench. The gasoline filter is removed by taking any No. 10-32 screw (one of the flame shield mounting screws serves the purpose) and screwing it into the filter until sufficient contact is made. Grasp head of screw and pull out the filter (fig. 72).

(2) Atomizer. When nozzle assemblies are removed from the mounting plate, the atomizer also separates from the plate. The socket head plugs in the atomizer can be removed by unscrewing them with socket head wrenches.

d. Assembly. (1) Air and gasoline nozzle assemblies. Assemble nozzle assemblies by reverse procedure of their disassembly (par. 89c) and insert them into the holes in the mounting plate in following manner:

- Hold mounting plate so that spark plug nut is down.
- Insert air nozzle assembly into the hole on the right of the plate and the gasoline nozzle assembly into the left hole. Make certain the gasket is present on both tubes.

(2) Atomizer body. Hold atomizer so that slot in atomizer body is down and align the holes in the atomizer with the connector portions

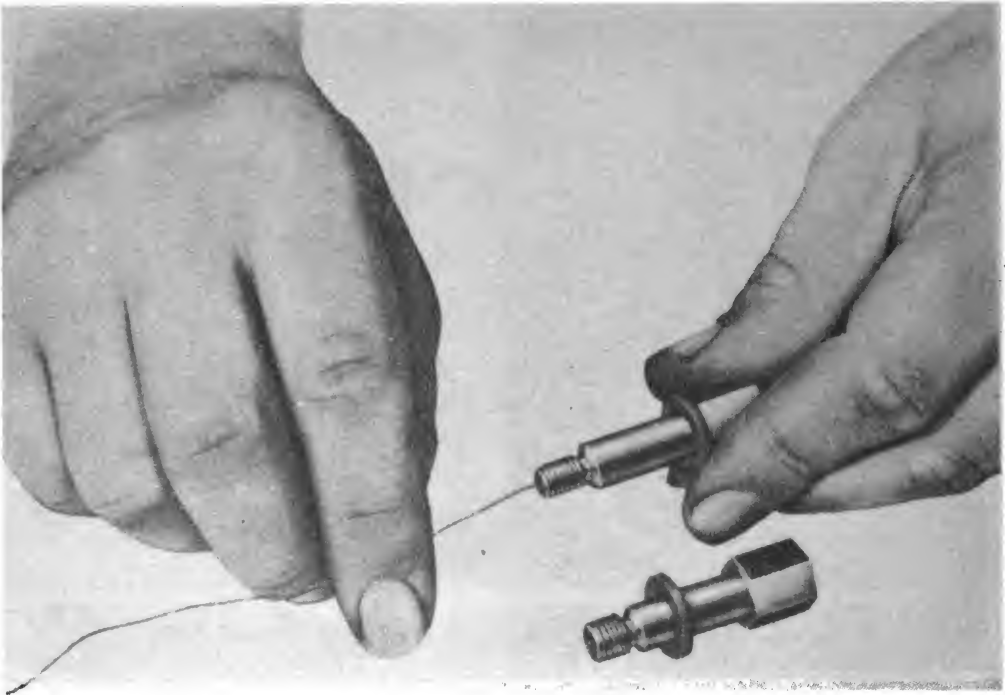


Fig. 73. Using clean-out wire in nozzle body.

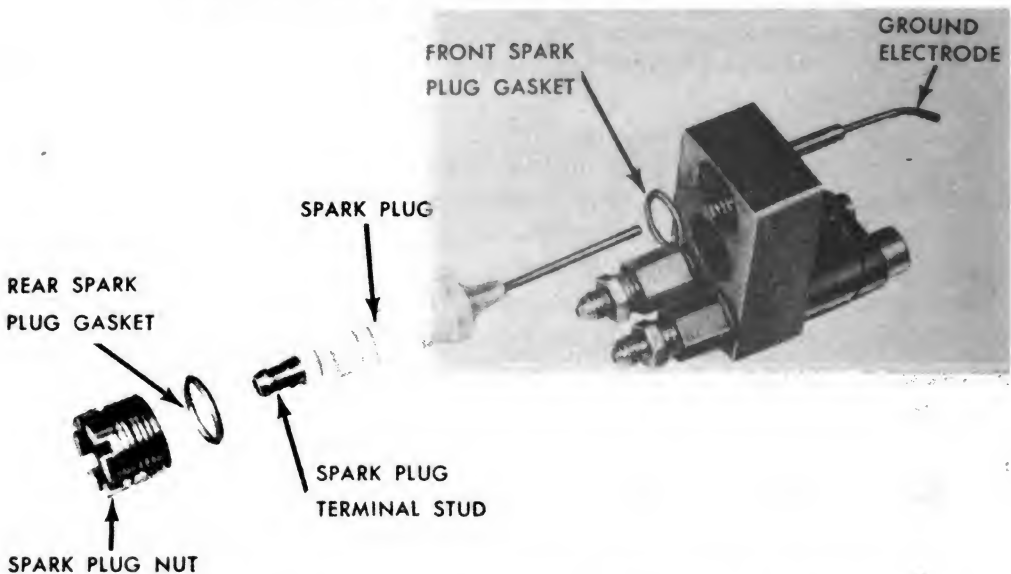


Fig. 74. Exploded view showing spark plug, spark plug nut, and ground electrode.

of the nozzle assemblies. Screw nozzle assemblies into atomizer using wrench to tighten.

e. Maintenance. (1) Clean gasoline filter after every 10 missions by removing, washing in cleaning solvent, drying, cleaning with clean-out wire, and replacing.



Fig. 75. Unscrewing spark plug nut using spanner wrench.

(2) Clean air and gasoline nozzles by inserting clean-out wire through externally threaded end (fig. 73). Wash in cleaning solvent and replace.

#### **90. SPARK PLUG AND CONNECTIONS.**

a. Components. These consist of the spark plug, ground electrode, and spark plug cable (fig. 64). The spark plug is secured to the atomizer mounting plate by the spark plug nut (fig. 74). The electrode is made of tungsten steel and is mounted in a stainless steel socket which in turn is screwed into the mounting plate (fig. 74).

b. Removal. (1) Spark plug. To remove the spark plug:

- Slide off atomizer assembly from fuel nozzle assembly (par. 88b).
- Remove spark plug nut with spanner wrench and slide out spark plug (fig. 75). Remove the two gaskets on the spark plug.

(2) Ground electrode. Remove flame shield and remove electrode assembly from mounting plate with adjustable wrench. Do not attempt to separate electrode from its mounting.

c. Installation. (1) Spark plug.

- Place the two gaskets on the spark plug and insert plug into the hole of the mounting plate.
- Slide spark plug nut over the spark plug and up to the mounting plate.
- Screw nut into the mounting plate and tighten with the spanner wrench.



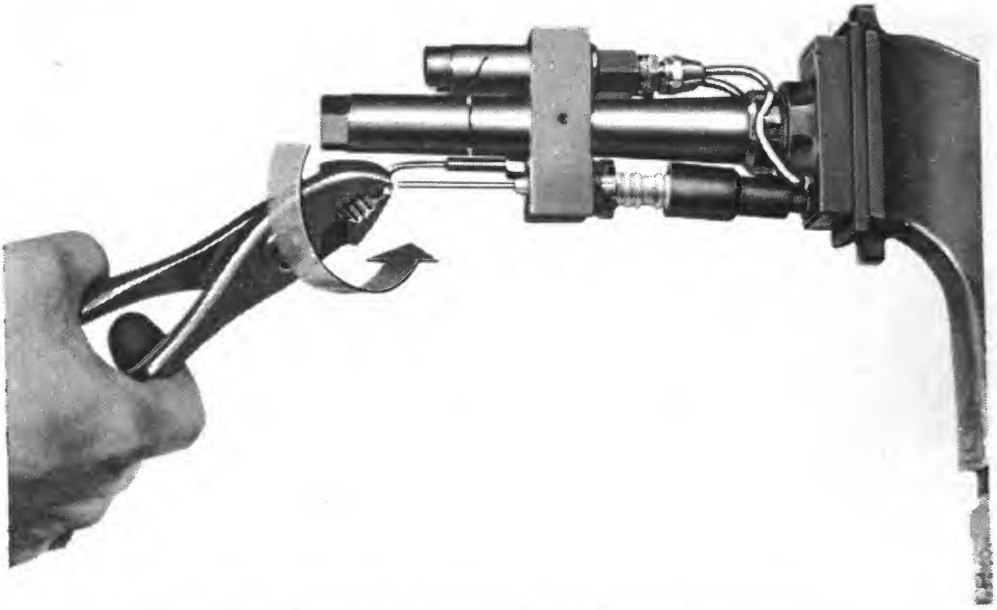


Fig. 76. Adjusting location of ground electrode.

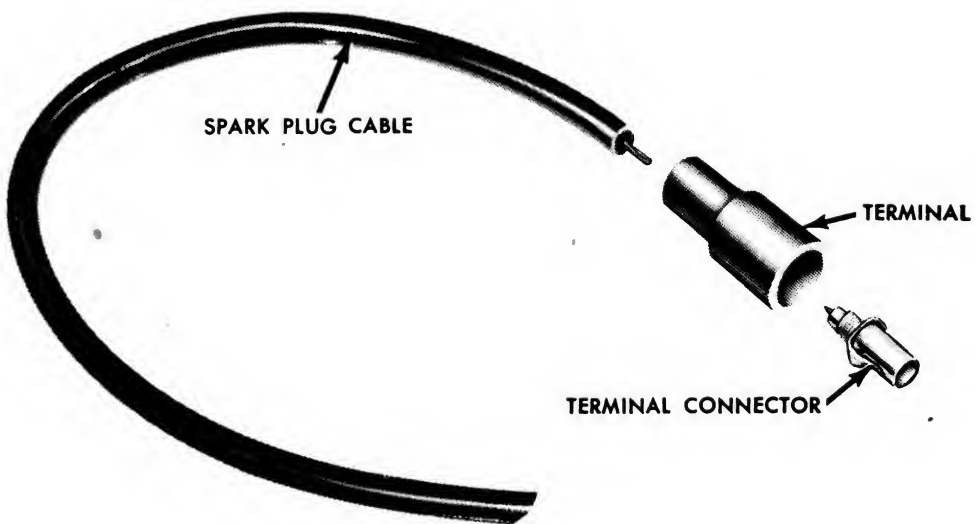


Fig. 77. Spark plug cable.

--Connect spark plug cable to spark plug terminal.

--Reinstall atomizer assembly (par. 88c).

(2) Ground electrode. To install, reverse procedure of b(2) above.

(3) Adjustment of electrode. The tip of the electrode must be directly under the end of the spark plug or an improper gap results. If the electrode tip is not under the spark plug tip, rotate the electrode with a pair of pliers (fig. 76), until it is in desired position. The gap

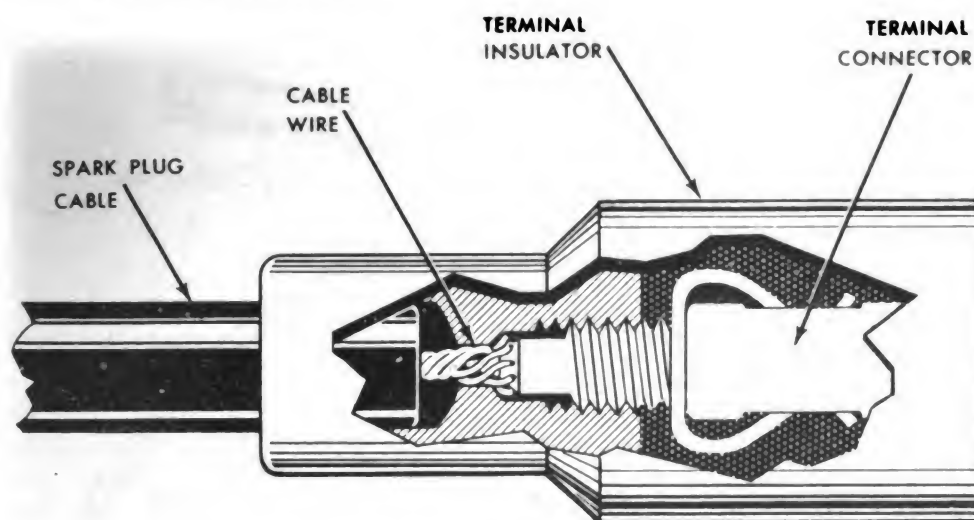


Fig. 78. Section of spark plug cable terminal showing connection to cable wire.

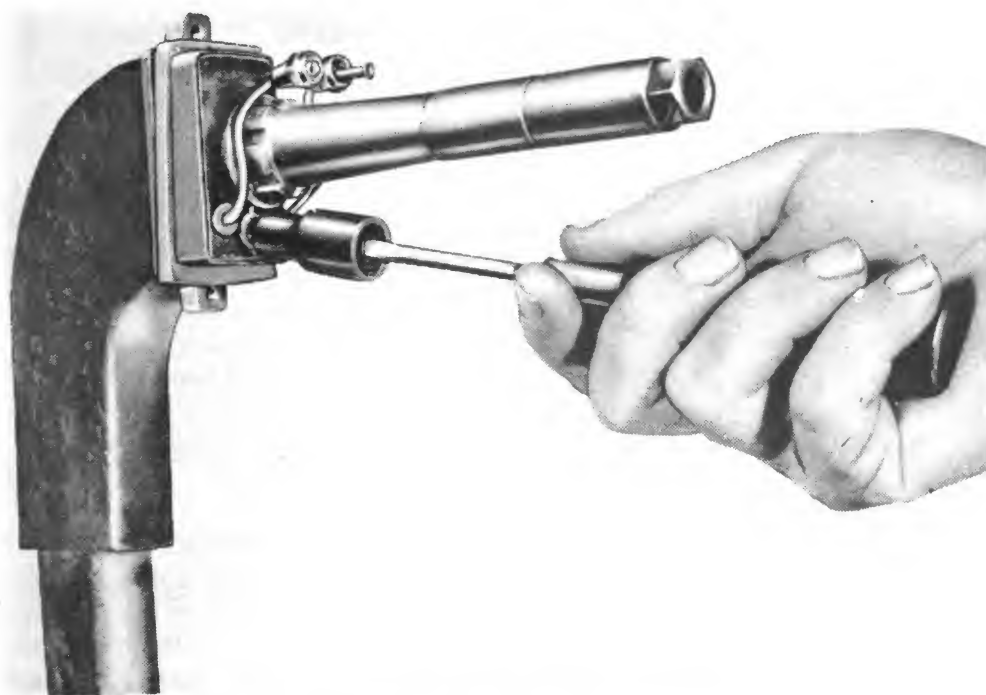


Fig. 79. Unscrewing terminal connector.

between the electrode and the spark plug may be adjusted by bending the electrode with the pliers. The smallest gap that produces a blue spark is used; this varies from  $1/16$  to  $1/8$  inch.

d. Replacing spark plug cable (figs. 77 and 78). Remove spark plug end terminal by inserting screwdriver blade into terminal connection, unscrewing connector (fig. 79), and removing terminal from cable.

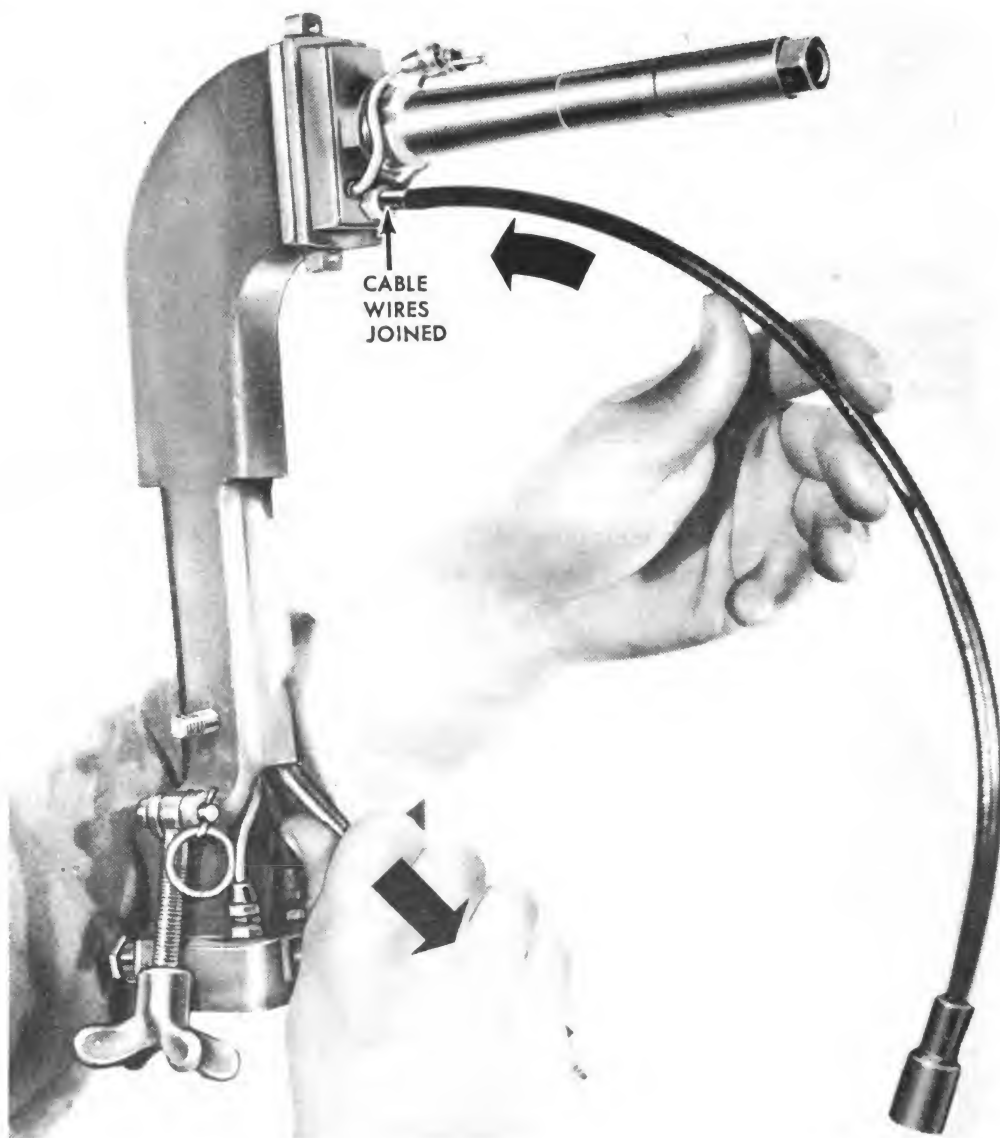


Fig. 80. Pulling out old cable and drawing new cable into position.

After removing the spark plug end terminal, use clean-out wire to fasten the coil end of the cable to be installed to the spark plug end of the cable to be removed. Grasp coil end of cable to be removed and draw the old cable through the barrel assembly (fig. 80). This action also draws the new cable into place. Detach clean-out wire from new cable and replace coil end terminal.

e. Maintenance. (1) Clean spark plug and electrode after every 10 missions. Replace worn or defective parts of spark plug assembly. If any part of ground electrode is defective, replace as a unit.

(2) If cable covering is broken, worn, or frayed, replace cable.

## Section XXIII. GUN CONTROL ASSEMBLY.

### 91. COMPONENTS.

The gun control assembly (fig. 61) consists of the ignition spark coil, barrel coupling bracket, gasoline housing, discharge valve, trigger control, valve block, and distributor plate assemblies.

a. Removal. Gun control assembly can be removed from gun barrel assembly by procedure described in paragraph 23.

b. Installation. To connect gun control assembly to gun barrel assembly, see paragraph 23.

### 92. IGNITION COIL ASSEMBLY.

a. General. This coil converts the 12-volt battery current into high voltage current (approximately 10,000 volts) required for proper spark plug operation (fig. 81). The coil is retained in the coil tube by a cap which is secured by screws.

b. Removal. (1) Disconnect coil end terminal of spark plug cable from coil terminal.

(2) Unscrew the three nuts from studs securing coil cap to coil tube.

(3) Lift off cap.

(4) Disconnect ground wire from coil cap support (fig. 82) and disconnect lead from distributor plate to pole on coil.

(5) Lift coil assembly from coil tube (fig. 83).

c. Installation. To install coil assembly, reverse procedure for removal.

### 93. BARREL COUPLING BRACKET ASSEMBLY.

a. General. This assembly is mounted on the discharge valve body and is used to support and lock the barrel assembly to the gun control assembly. For use of the barrel coupling bracket assembly, see paragraph 23.

b. Removal. Unscrew coupling locking pins with a thin open end wrench (fig. 84) and lift off the assembly.

c. Installation. To install, reverse procedure for removal.

### 94. GASOLINE HOUSING ASSEMBLY (fig. 85).

a. Description. This assembly consists of an aluminum gasoline reservoir, a pump, and a coil tube. The housing is an aluminum container with a cup (coil tube) welded into the bottom section of the reservoir. The coil is located in this cup.

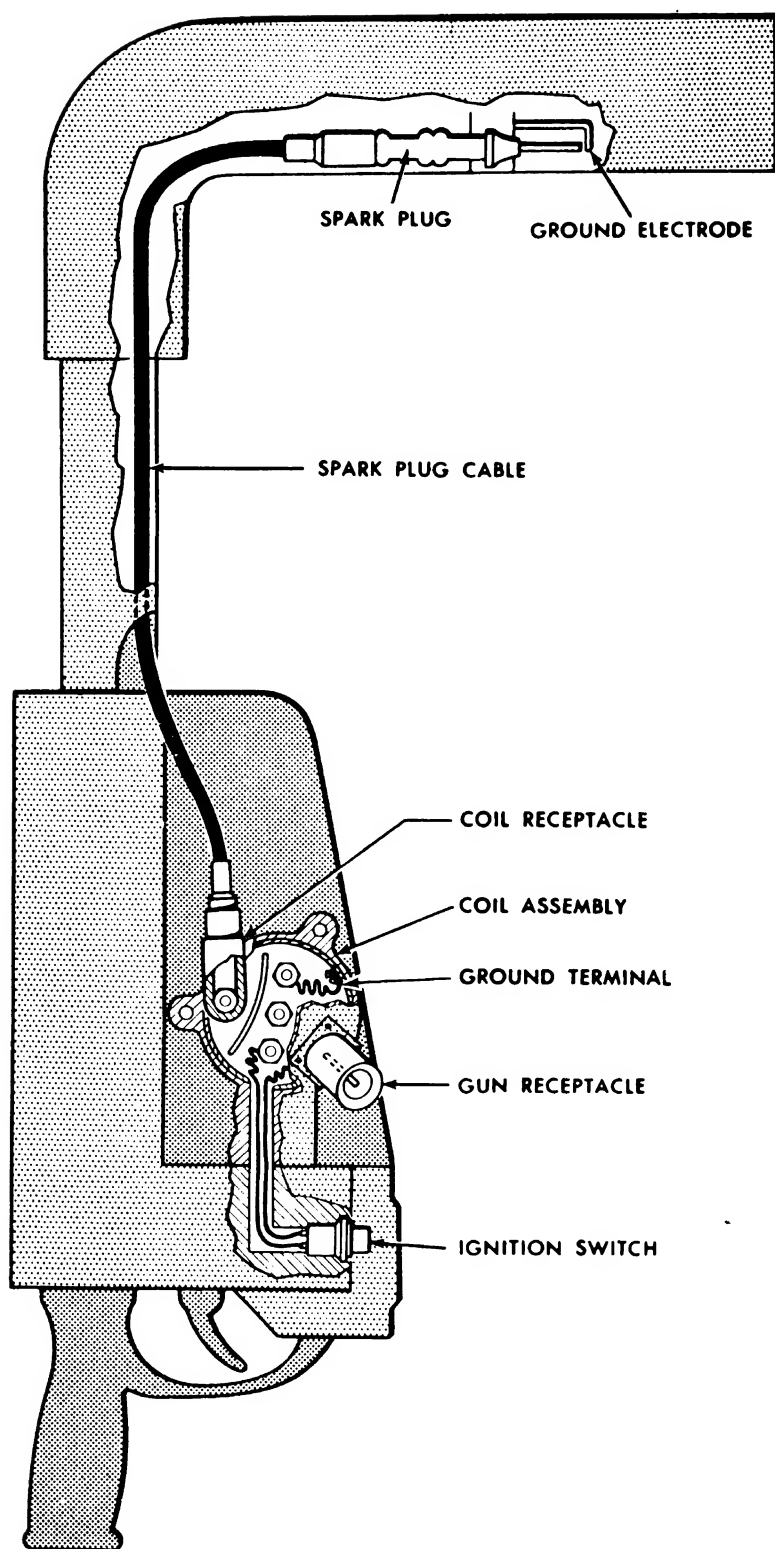


Fig. 81. Flame gun electrical system showing relation of coil assembly to other parts of system.

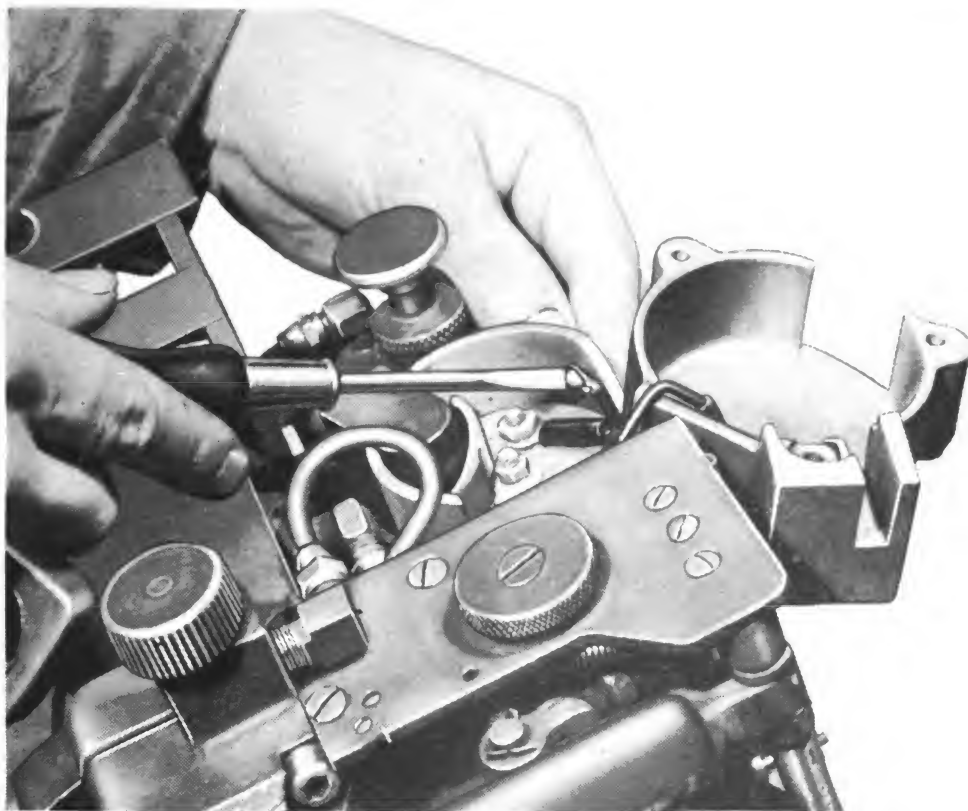


Fig. 82. Disconnecting ground wire from coil cap supports.

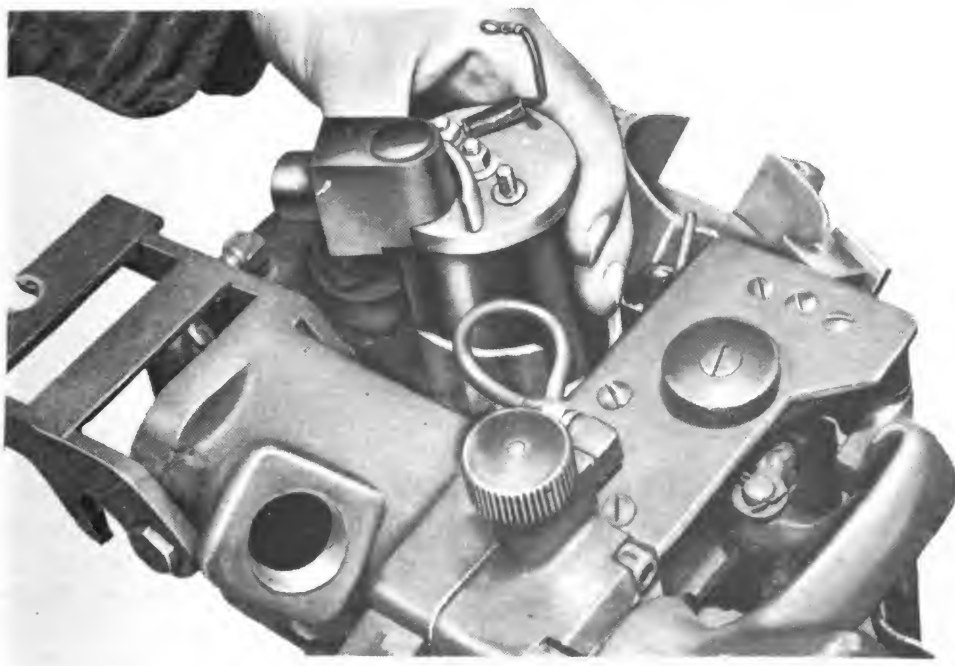


Fig. 83. Lifting out coil.

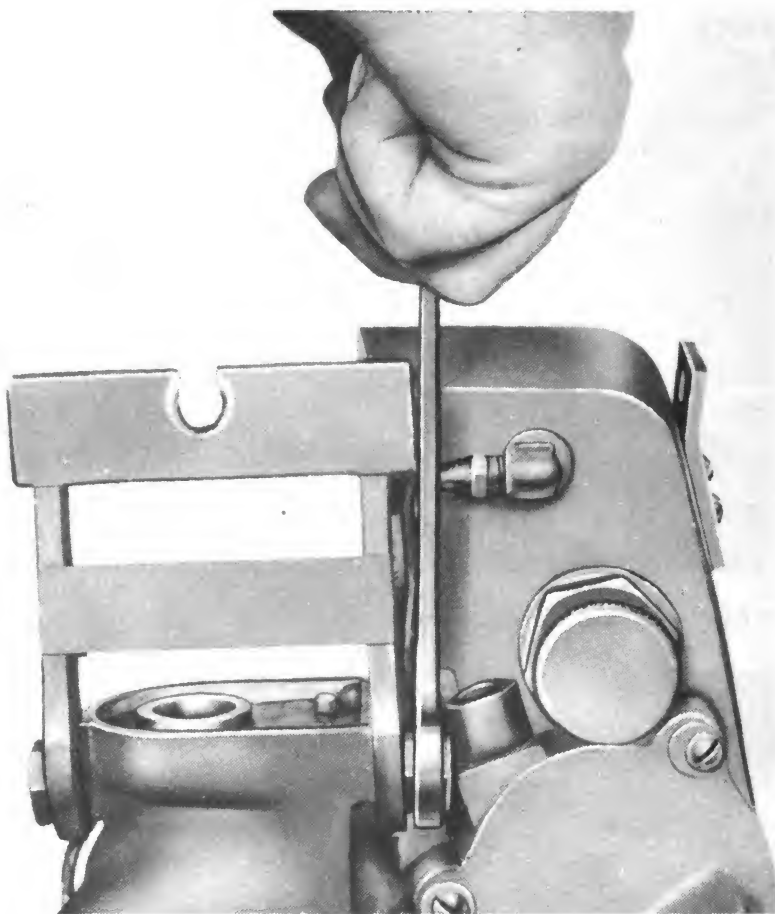


Fig. 84. Unscrewing barrel mounting pin.

(1) Gasoline reservoir. The upper portion of the housing assembly is the gasoline reservoir which holds approximately 1-1/4 pints of gasoline. A filler opening, through which the reservoir is filled, is located on the front of the reservoir and is closed by the gasoline filler plug (fig. 86).

(2) Pump. The pump is screwed into the reservoir above the coil tube. A gasket effects the seal with the reservoir.



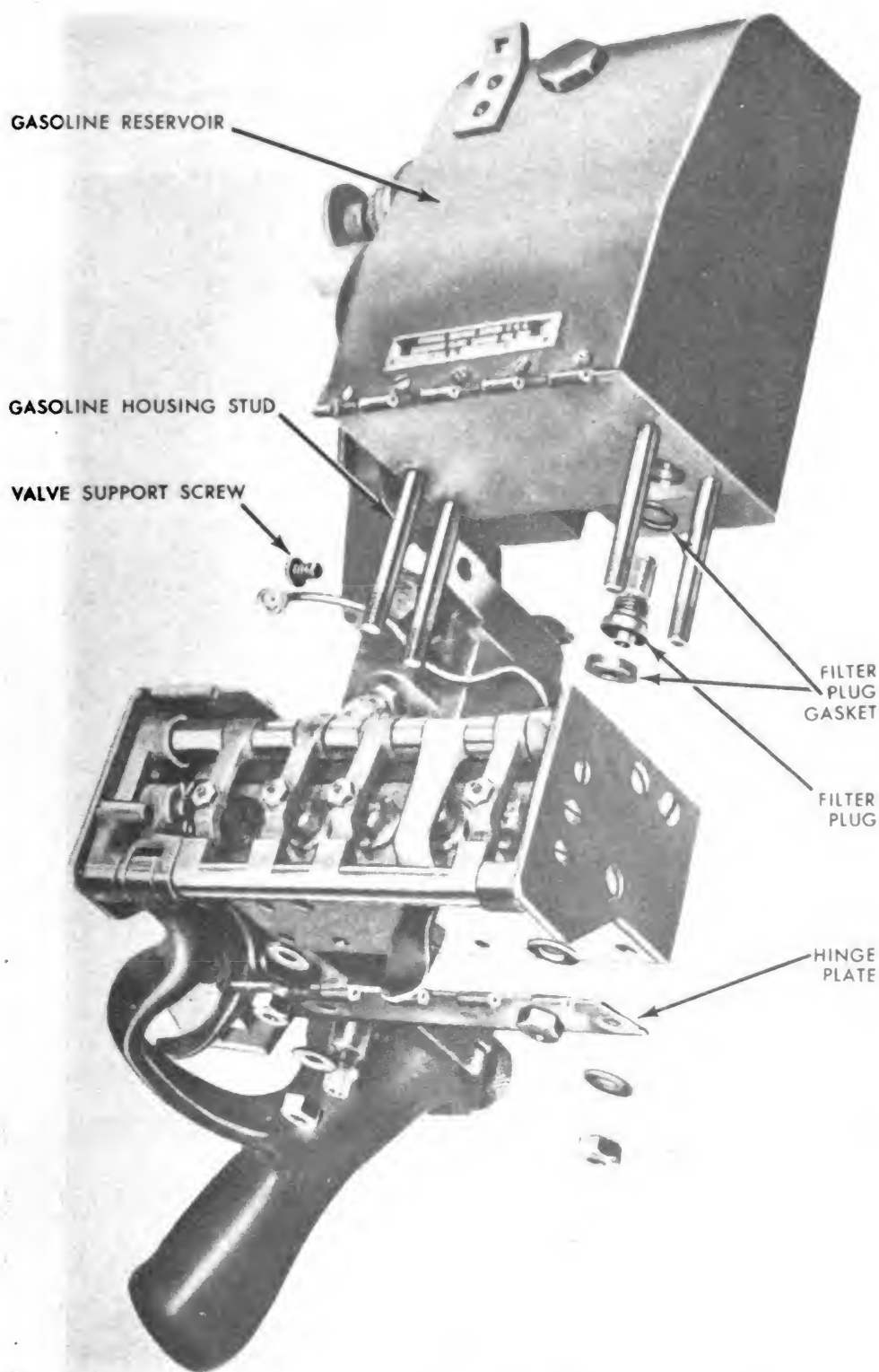


Fig. 85. Gasoline housing assembly separated from remainder of gun control assembly.

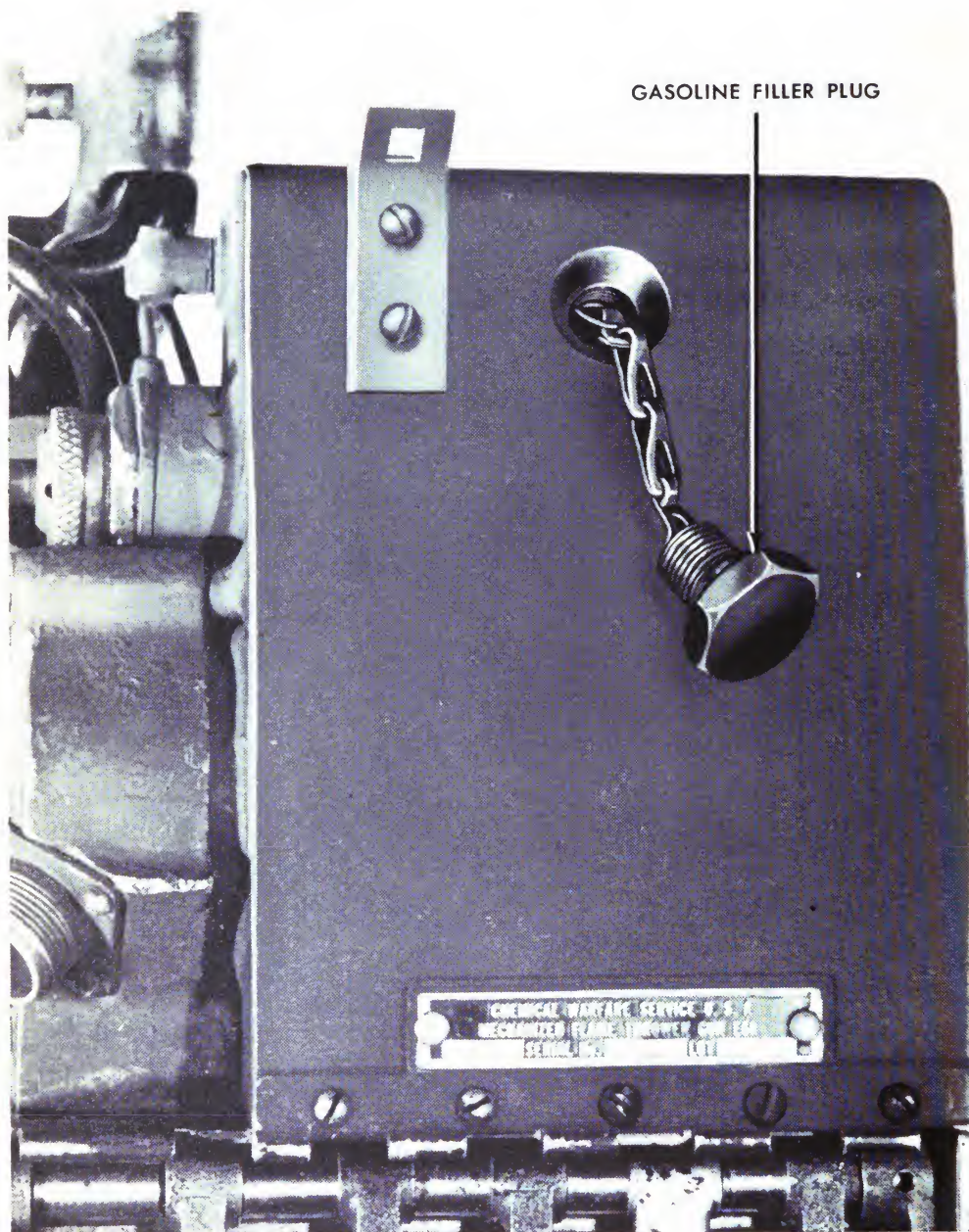


Fig. 86. Gasoline filler plug unscrewed from gasoline reservoir.

(3) Pressure gage tube. This tube exits above the pump and connects to the pressure gage.

(4) Gasoline filter plug and filter (fig. 85). At the bottom of the gasoline housing assembly is the gasoline outlet into which the filter plug is screwed. The housing filter, which serves to remove foreign matter as gasoline passes from the reservoir, projects into the reservoir and is joined to the filter plug. A gasket assists in making a seal

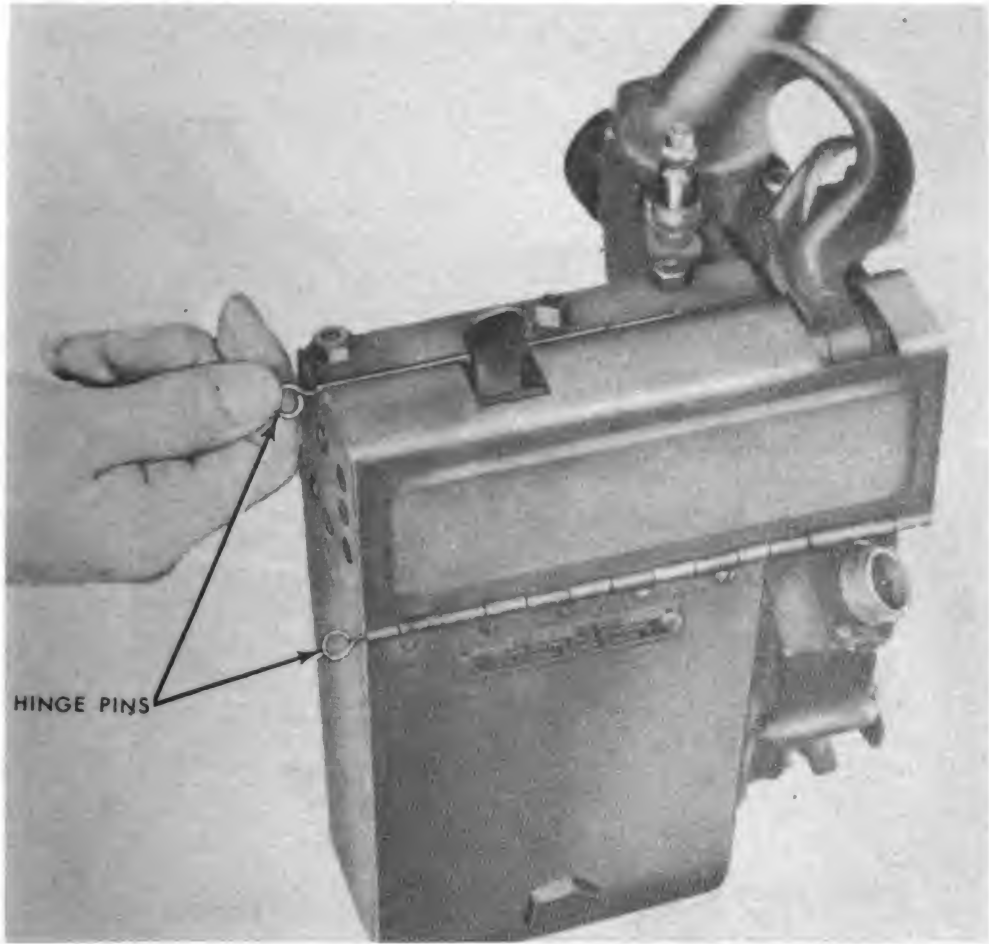


Fig. 87. Removing hinge pins.

between the filter plug and the gasoline outlet in the container and between the outside of the plug and the distributor plate.

b. Removal of housing assembly from control assembly. (1) Disconnect pressure gage tube from gasoline container by unscrewing tube nut.

(2) Remove control dust cover by pulling out the two hinge pins (figs. 87 and 88).

(3) Remove the four stud nuts and washers from studs on bottom of valve block (fig. 89). The bottom hinge plate is also removed.

(4) Remove the screw holding discharge valve housing to gasoline reservoir.

(5) Remove coil cap (par. 92b) and disconnect the three studs which hold the cap in place.

(6) Lift off gasoline reservoir (fig. 85). If the reservoir does not lift off easily, drive it off by means of a hammer, with a block of wood interposed between it and the gasoline reservoir.

c. Installation of housing assembly. To install the gasoline housing



Fig. 88. Dust cover removed.



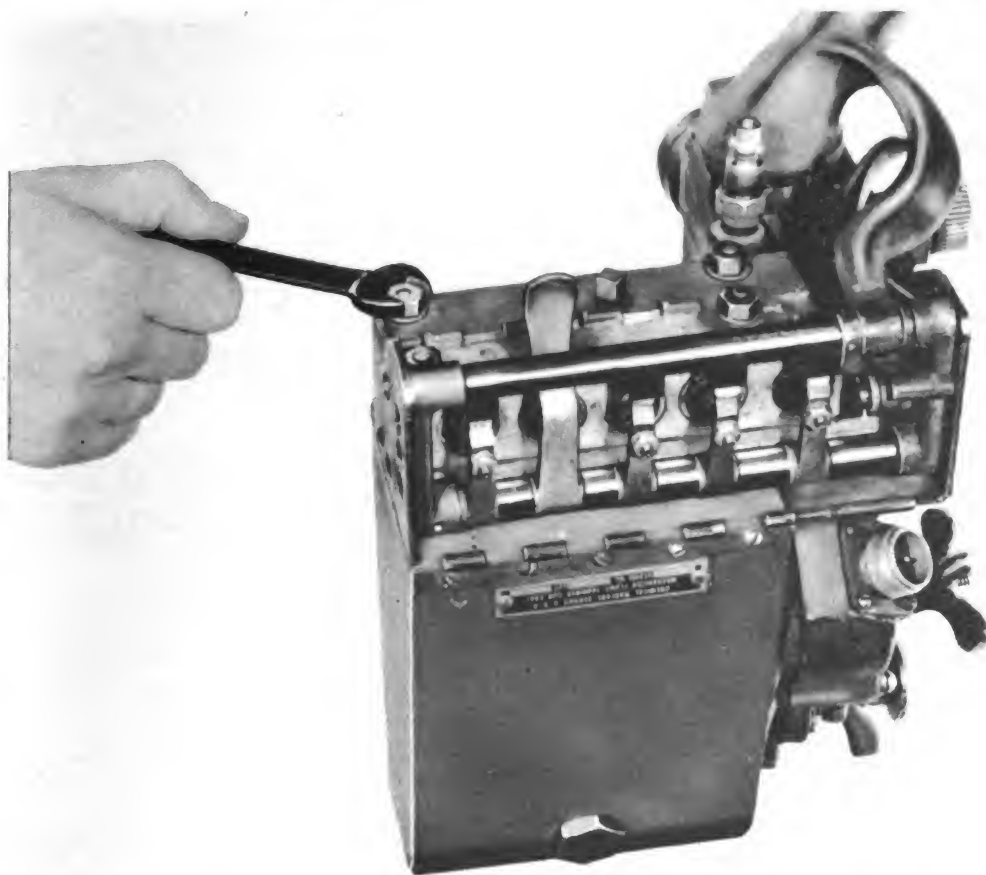


Fig. 89. Unscrewing stud nuts from gasoline housing studs.

assembly, reverse removal procedure. Make certain that the pressure gage tube will be in correct location after the container is installed (fig. 90).

d. Removal and replacement of pump. (1) To remove pump, unscrew it from the housing with a wrench. The entire pump assembly can now be removed.

(2) To replace the pump, reverse procedure for removal.

e. Removal and replacement of filter plug and filter (fig. 85). (1) To remove the filter plug and filter from the gasoline reservoir, remove housing assembly from control assembly, and unscrew plug from reservoir with the special spanner wrench.

(2) To replace filter plug and filter, reverse procedure given for removal. Make certain that the gasket is in place between the plug and the gasoline reservoir (fig. 85). Also be sure that the rubber gasket is in place between the plug and the seat on the distributor plate.

f. Maintenance. (1) Pump. Do not disassemble the pump. If it does not function properly, replace defective parts or entire pump.

(2) Filter. After every 10 missions, remove filter, clean with cleaning solvent, and reinstall. If filter fails to function properly, replace filter and filter plug as a unit.

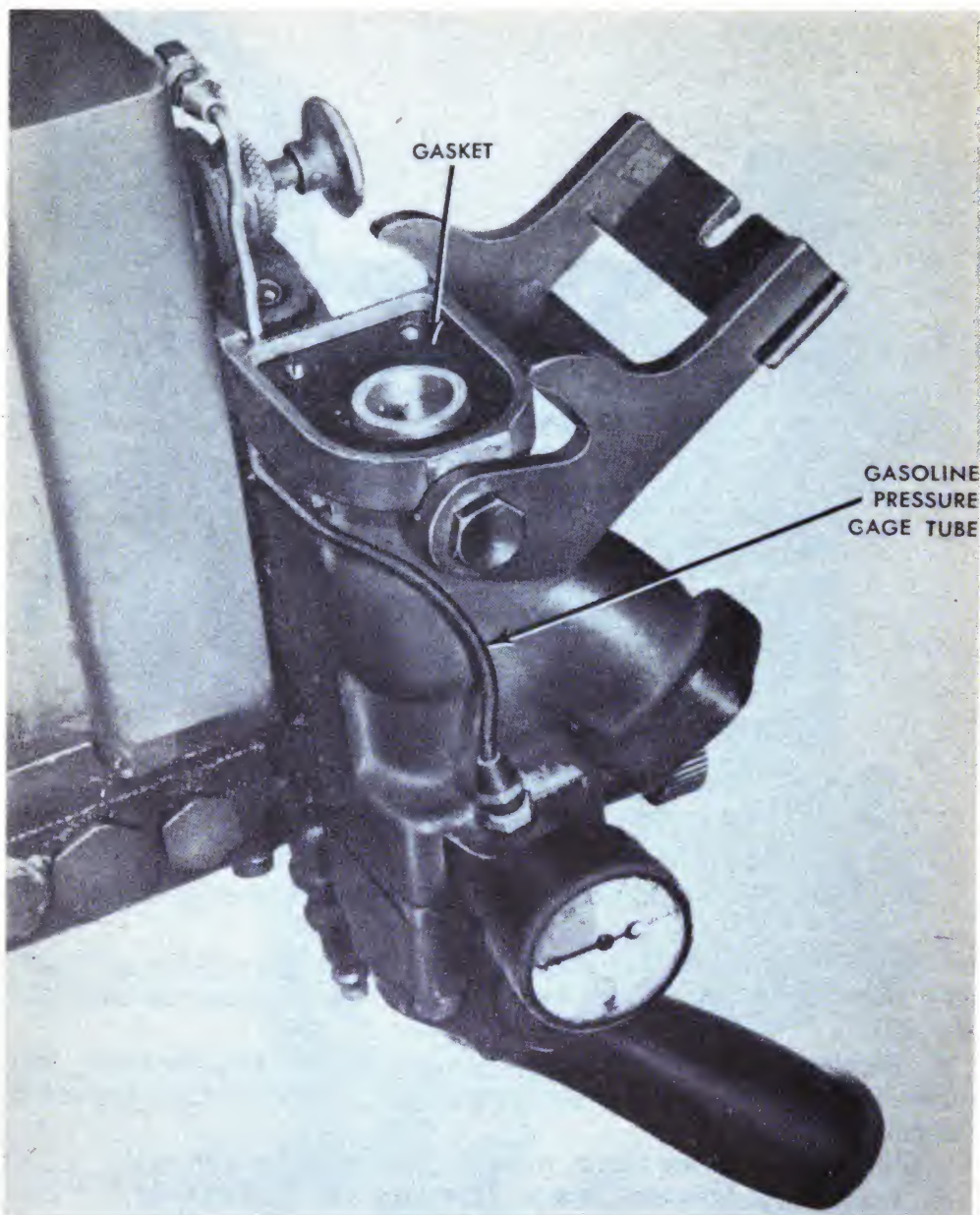


Fig. 90. Correct location of pressure gage tube.

## 95. DISCHARGE VALVE ASSEMBLY.

a. General. This assembly consists of a discharge valve body, discharge valve plunger assembly, blow-out check valve, and air cylinder assembly. When the trigger is operated, the discharge valve functions as shown in figure 91. When blow-out lever is depressed, the valve functions as shown in figure 92. The discharge valve body is mounted on top of the support projecting from the distributor plate, and the air cylinder assembly is mounted on the bottom of the support. The valve body and the air cylinder assembly are secured to the support by four

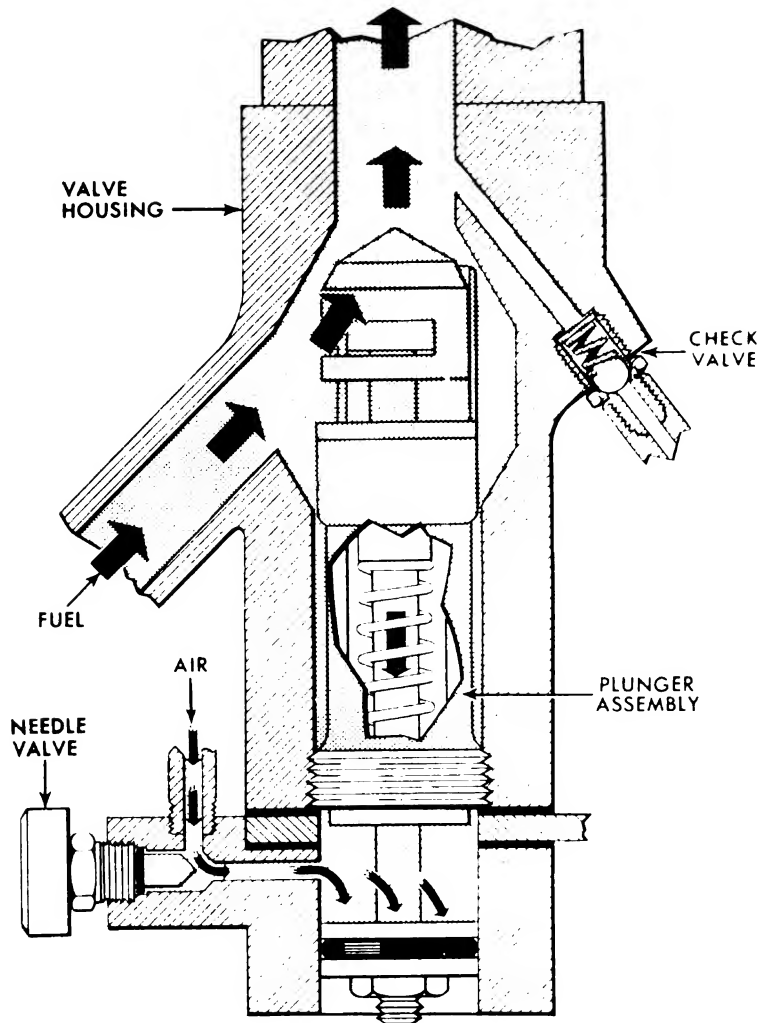


Fig. 91. Operation of discharge valve when trigger is pulled.

socket head screws. The plunger assembly and the blow-out check valve are located in the valve body.

**b. Removal.** To remove discharge valve assembly:

- (1) Remove gasoline housing assembly (par. 94b).
- (2) Disconnect the tube nuts on the three tubes leading from the distributor plate to the side of the valve body.
- (3) Disconnect tube nut joining elbow on needle valve.
- (4) Remove four socket head screws securing discharge valve assembly to support (fig. 93). This support (a above) is part of the distributor plate.
- (5) Pull off air cylinder assembly (fig. 94).
- (6) Lift discharge valve from support (fig. 95).

**c. Installation.** Reverse removal procedure.

**d. Removal of needle valve.** The needle is removed without removing discharge valve assembly from gun control assembly by:



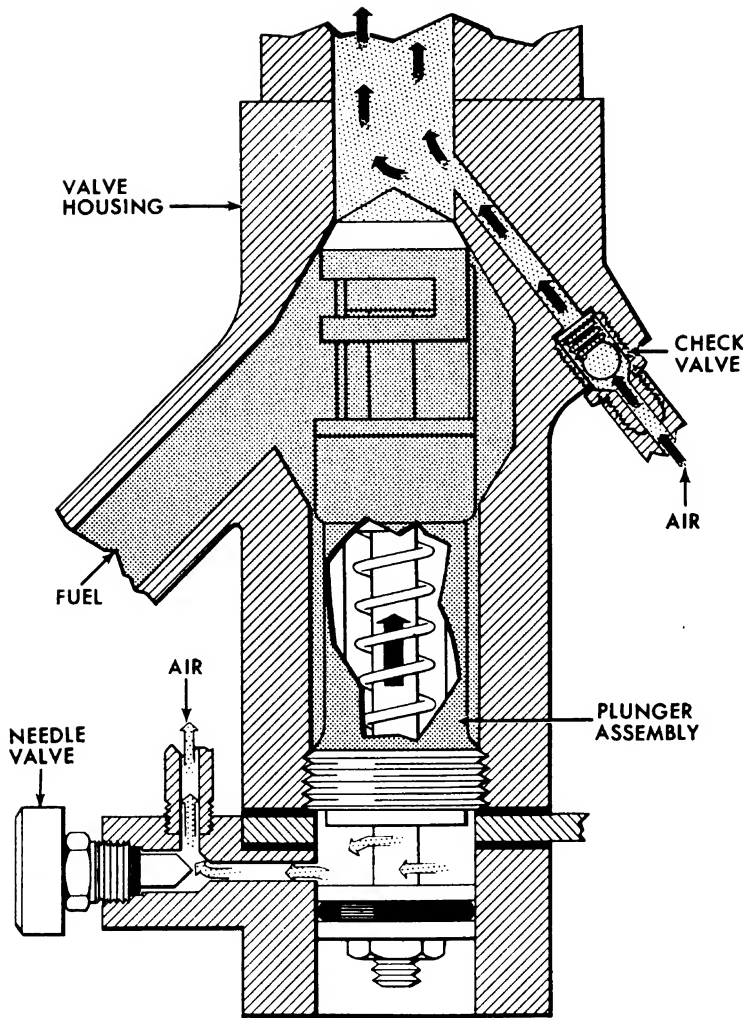


Fig. 92. Operation of discharge valve when blow-out lever is depressed.

- Turning knurled knob counterclockwise as far as it can go.
- Unscrewing valve from cylinder body with flat, open end wrench.
- e. Installation of needle valve. Reverse procedure for removal.
- f. Removing and replacing gun grip locking knob. (1) This knob can be removed without removing discharge valve assembly by removing knob from cylinder body with a socket head wrench.
- (2) To replace, reverse procedure for removal.
- g. Disassembly of discharge valve (fig. 96). After removing discharge valve body (b above), disassemble as follows:
  - Unscrew lock nut on plunger piston.
  - Slide off piston.
  - Unscrew spring retainer with a spanner wrench (fig. 97) and remove retainer.
  - Remove plunger spring inside valve body.

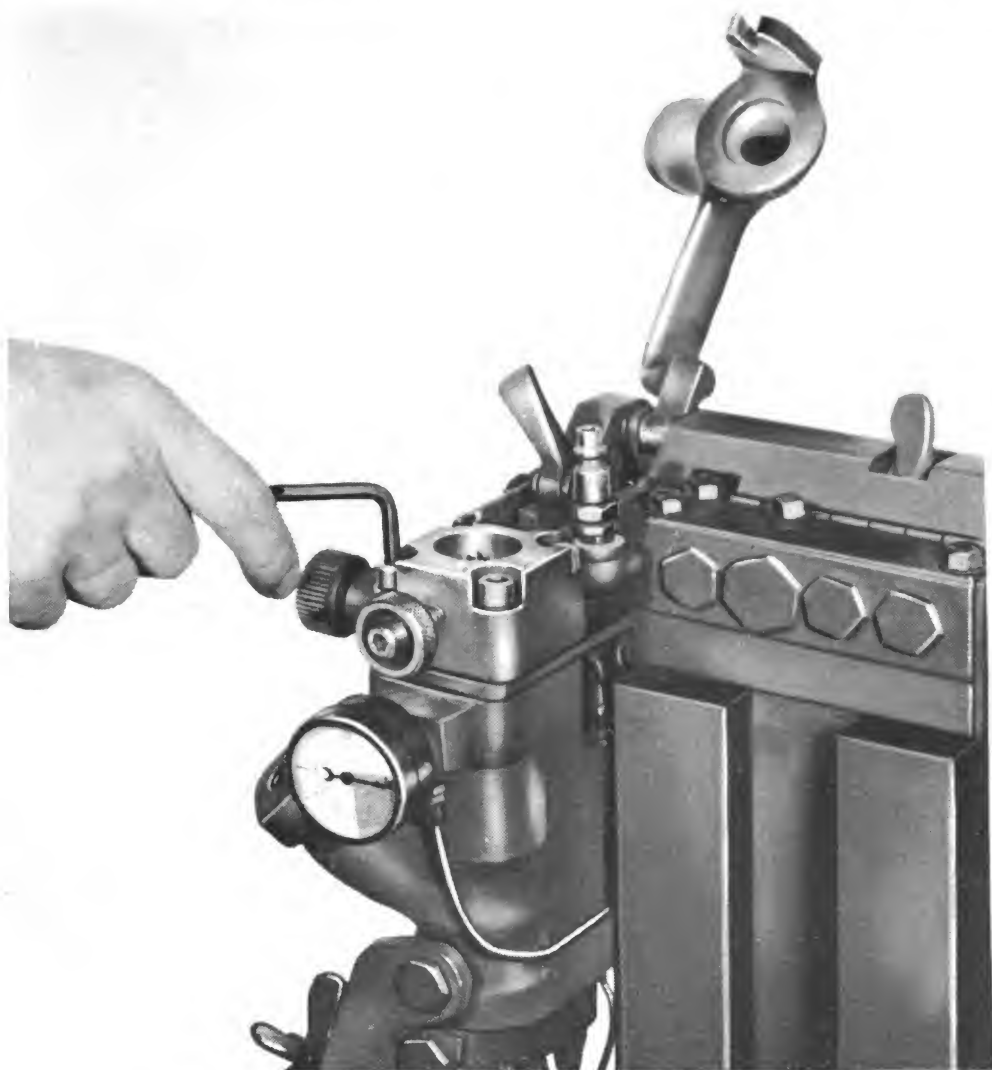


Fig. 93. Removing screws from bottom of air cylinder.

- Unscrew valve body with spanner wrench (fig. 98).
- Grasp valve stem with fingers and pull out remainder of plunger assembly. Slide valve spring off the valve stem.
- h. Assembly of discharge valve. Reverse procedure for disassembly.  
NOTE: During disassembly of valve, gasket on valve body may be damaged. If this occurs, replace gasket.
- i. Maintenance. Removal or disassembly of discharge valve assembly should not be attempted except for replacement of parts or to remedy faulty operations.

## 96. TRIGGER CONTROLS.

- a. General. The trigger controls consist of the trigger mechanism and the valve control mechanism. The trigger, when pulled, rotates the camshaft which in turn depresses the control levers. Lugs on the



Fig. 94. Removing air cylinder assembly.

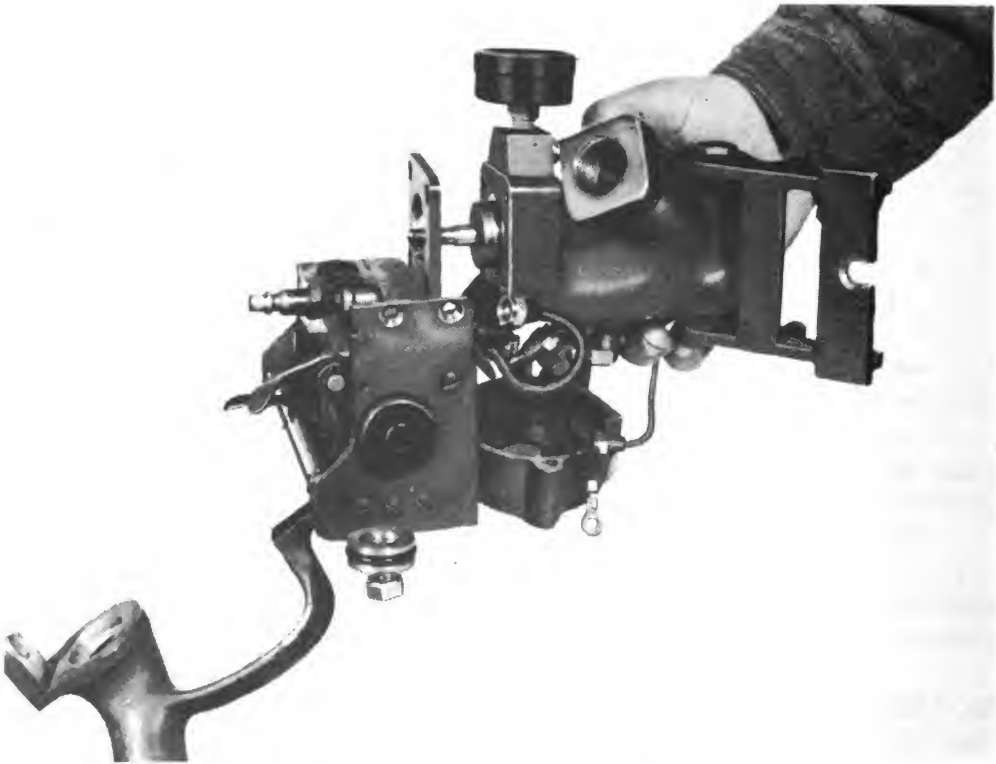


Fig. 95. Lifting discharge valve from support.

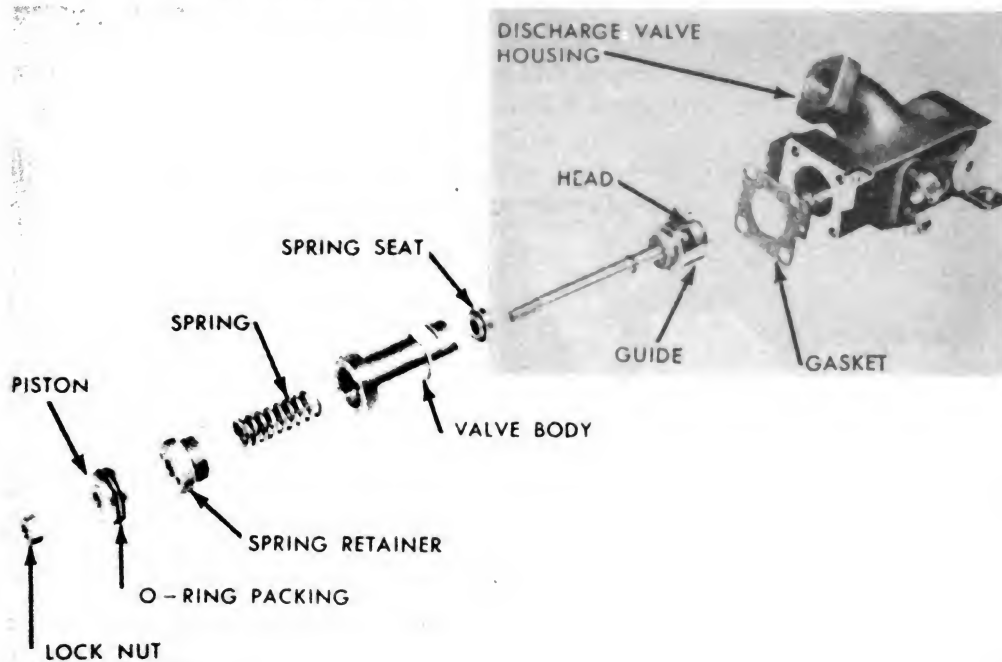


Fig. 96. Exploded view of valve plunger assembly.

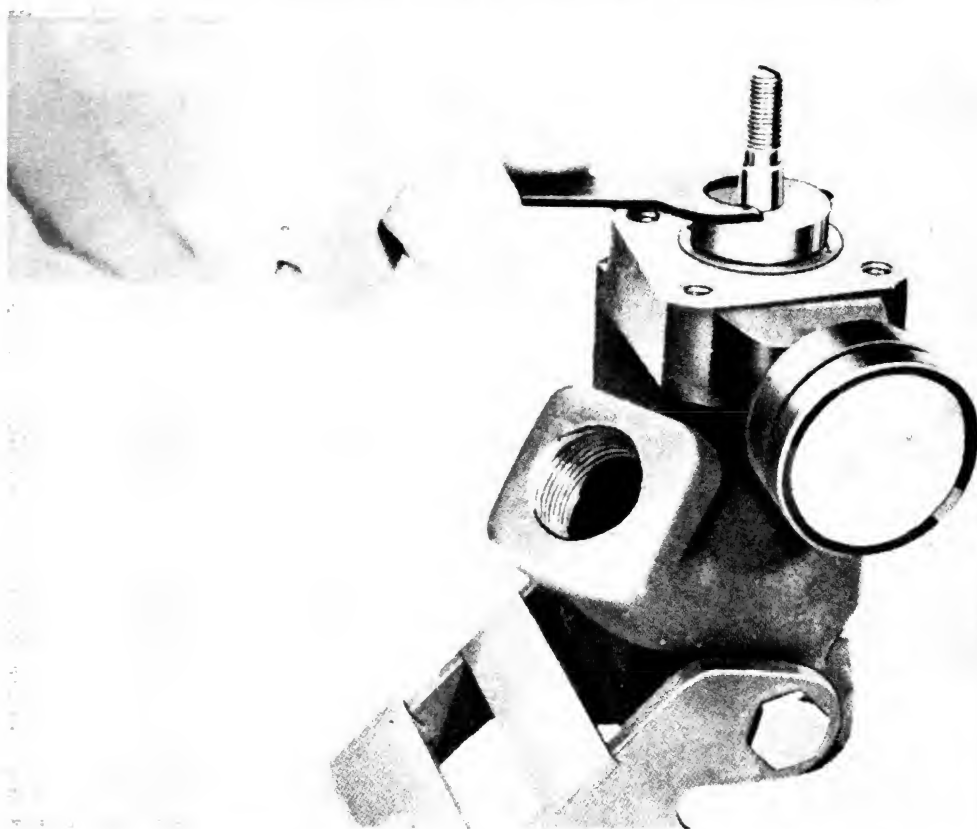


Fig. 97. Using spanner wrench to remove spring retainer.

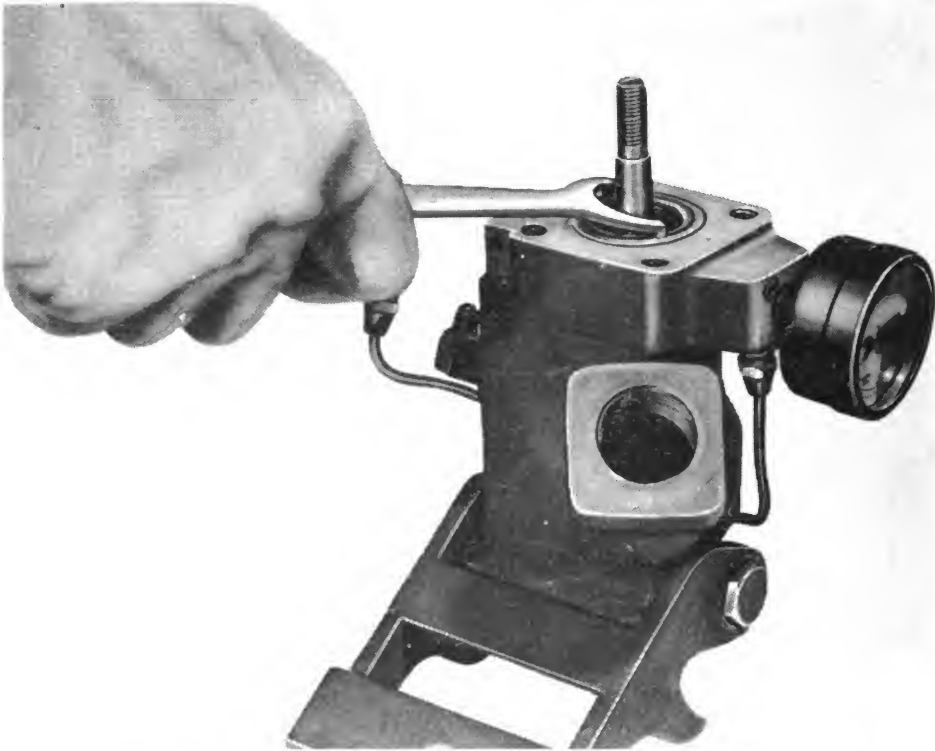


Fig. 98. Using spanner wrench to remove valve body.

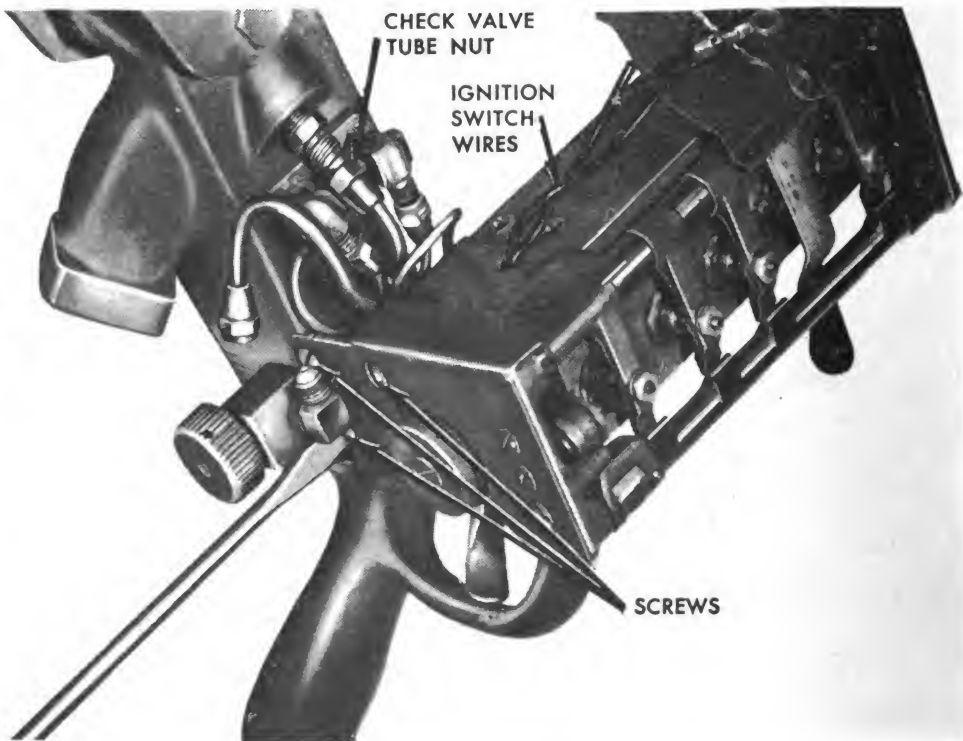


Fig. 99. Removing the three screws which secure safety plate.

control levers operate the valves (except the blow-out valve) when the control lever is depressed. When the operator releases the trigger, a spring, attached to the trigger at one end and to a hook near the cam-shaft at the other end, returns the valve control mechanism and trigger to their normal, nonoperating positions. The trigger safety knob, which is located on the housing above the trigger, locks the trigger in the safe position.

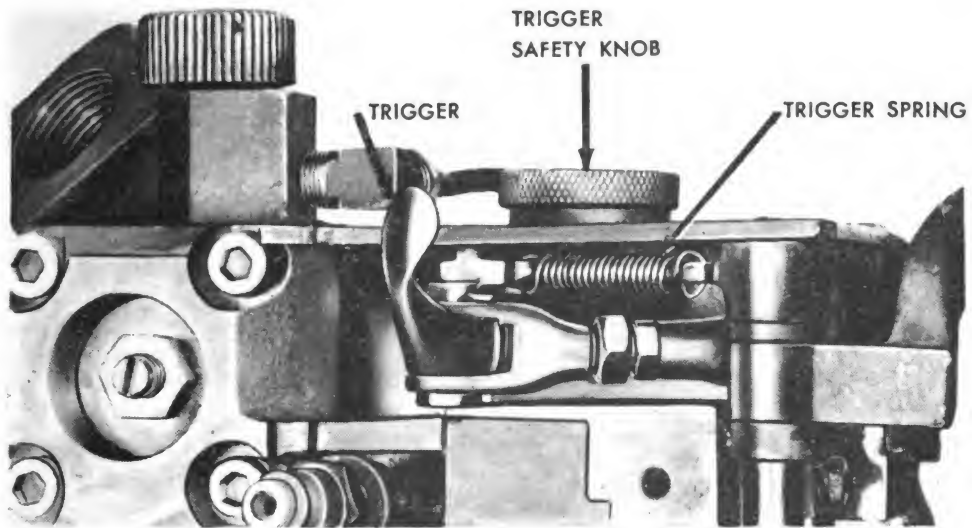


Fig. 100. Trigger spring (view from bottom of gun).

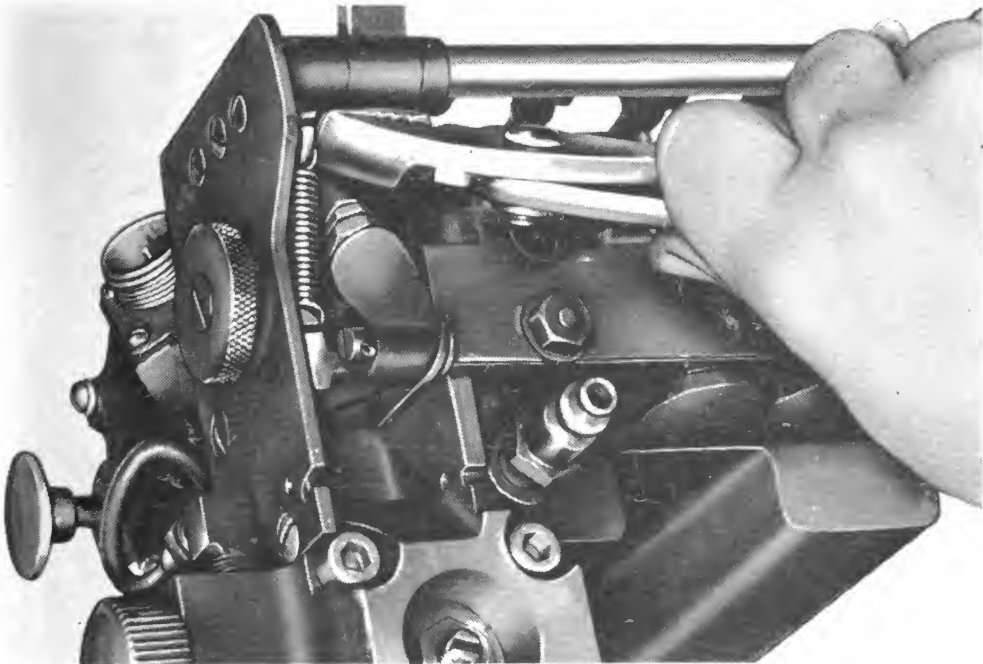


Fig. 101. Connecting loop on end of trigger spring to hook.

- b. Removal. (1) Remove gasoline housing assembly (par. 94b).  
(2) Remove discharge valve assembly (par. 95b).  
(3) Remove the three screws securing the safety plate (fig. 99).  
(4) Remove trigger spring (fig. 100). To do this, insert blade of screw driver between spring and safety plate and pry spring off the two hooks which retain it.  
(5) Pry off safety plate.  
(6) Slide off camshaft and trigger mechanism from bearings on safety plate.  
(7) Remove control levers, spacers, and shaft.
- c. Installation. To install, reverse procedure for removal.
- d. Removal and replacement of trigger spring. It is not necessary to remove trigger controls in order to remove and replace trigger spring.
- (1) To remove spring from trigger mechanism:  
--Insert screw driver blade between spring and safety plate.  
--Pry spring off the two hooks which retain it.
- (2) To replace spring:  
--Hook one end of spring onto hook nearest trigger.  
--Grasp other end of spring with pliers and extend the spring

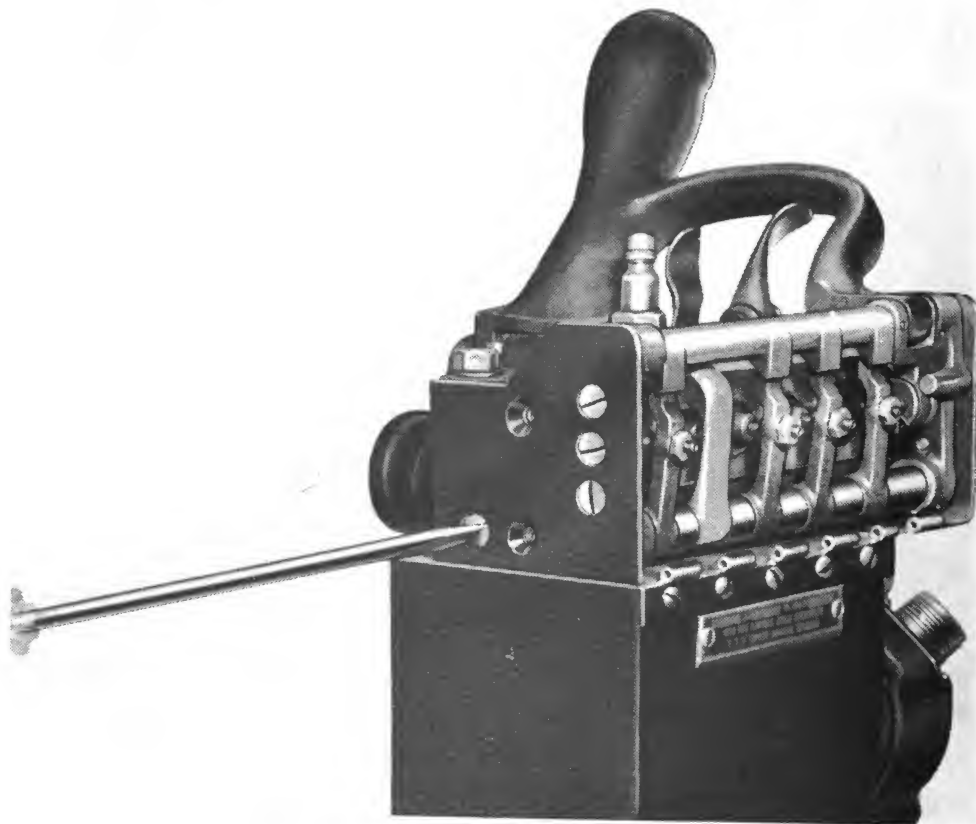


Fig. 102. Removing screws securing end plate.



until the loop on the end of the spring can engage the hook near the camshaft (fig. 101).

e. Removal and replacement of control levers. It is not necessary to remove trigger controls from gun to remove control levers.

(1) To remove control levers:

- Remove the three screws securing the plate (end plate) closest to the blow-out lever (fig. 102).
- Tie the control levers to one another with a piece of string or wire (fig. 103).
- Pry off the end plate (fig. 104).
- Remove control levers, spacers, and shaft upon which they are mounted (fig. 105).

f. Adjustment of control levers. Adjust control levers so that when trigger is pulled the ignition switch functions before the valves (except the blow-out valve). Air should reach the atomizer before it reaches gasoline. To do this:

(1) Prepare gun for test firing, but do not open fuel container valve or the air cylinder needle valve.

(2) Remove dust cover and flame shield.

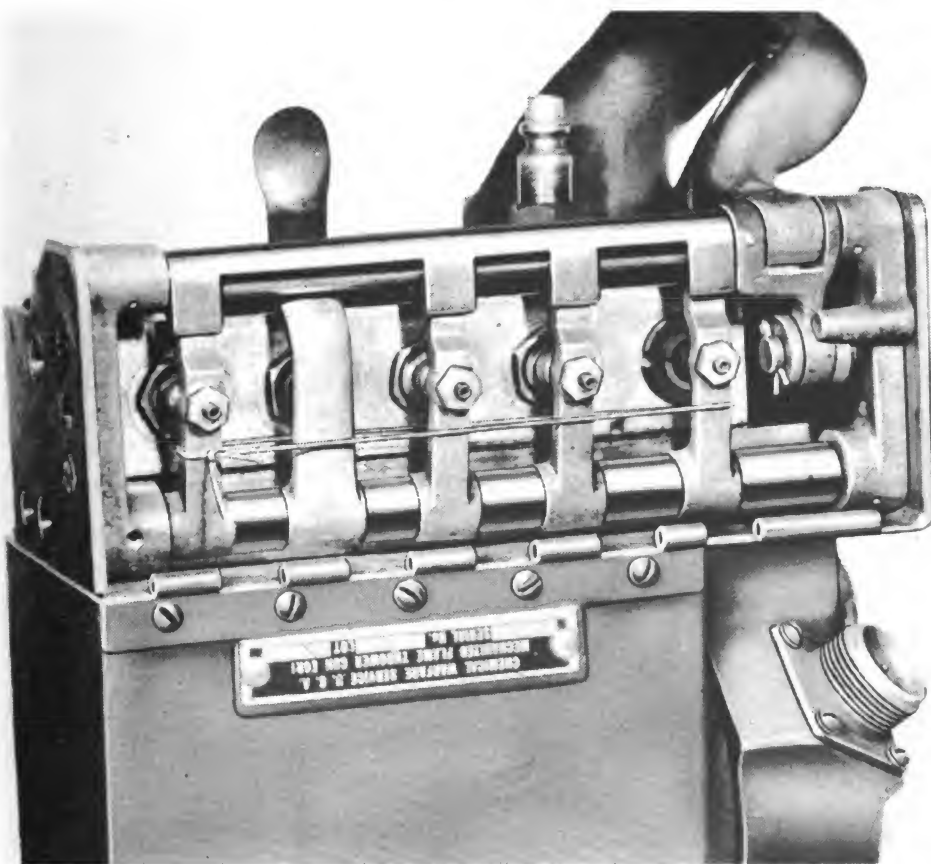


Fig. 103. Control levers tied together for removal.

(3) Loosen lock nuts on each control lever screw.

(4) With hex wrench, screw down ignition control lever adjusting screw until it touches the ignition switch.

(5) Screw down adjusting screws on valve control levers until screws touch the valve stems. Back the screws four turns.

(6) Pull trigger slowly until ignition spark is seen. If spark forms before operation of valves, continue pulling trigger until atomized gasoline flows from atomizer. Release trigger and secure adjusting screws in position by tightening lock nuts.

(7) If spark cannot be obtained before atomized gasoline flows from atomizer, release trigger and back the valve lever adjusting screws one turn. Continue procedures (1) through (6) until spark is obtained before flow of atomized gasoline.

### 97. VALVE BLOCK ASSEMBLY.

a. General. The valve block assembly (fig. 106 (A)) is secured under the distributor plate. It is enclosed by a dust cover which is secured by two hinge pins. The assembly consists of the valve block, ignition switch, and the air valve, gasoline valve, blow-out valve, and discharge

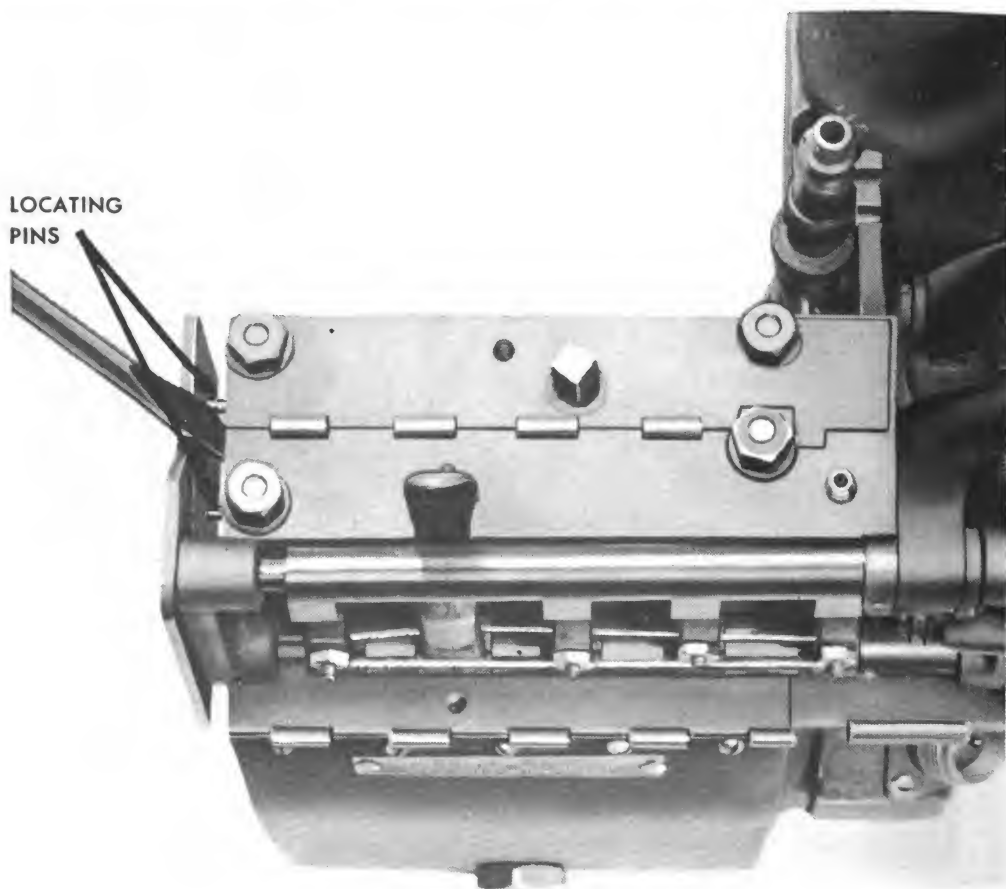


Fig. 104. Prying off end plate.

control valve (double valve) with their packings and retainers. One valve, the blow-out valve, is a manually operated valve. It is operated by depressing the blow-out lever. The other valves are operated simultaneously when the trigger is pulled.

b. Removal. To remove valve block assembly from gun control assembly:

(1) Remove gasoline housing assembly (par. 94b) and discharge valve assembly (par. 95b).

(2) Remove the three screws securing the safety plate.

(3) Remove trigger spring (par. 96d).

(4) Pry off safety plate.

(5) Slide camshaft and trigger mechanism from bearing.

(6) Tie string around control levers to hold them together.

(7) Remove control levers, spacers, and shaft.

(8) Separate valve block from distributor plate with a screw driver, pulling ignition switch wires through hole in distributor plate.

c. Installation. To install valve block assembly:

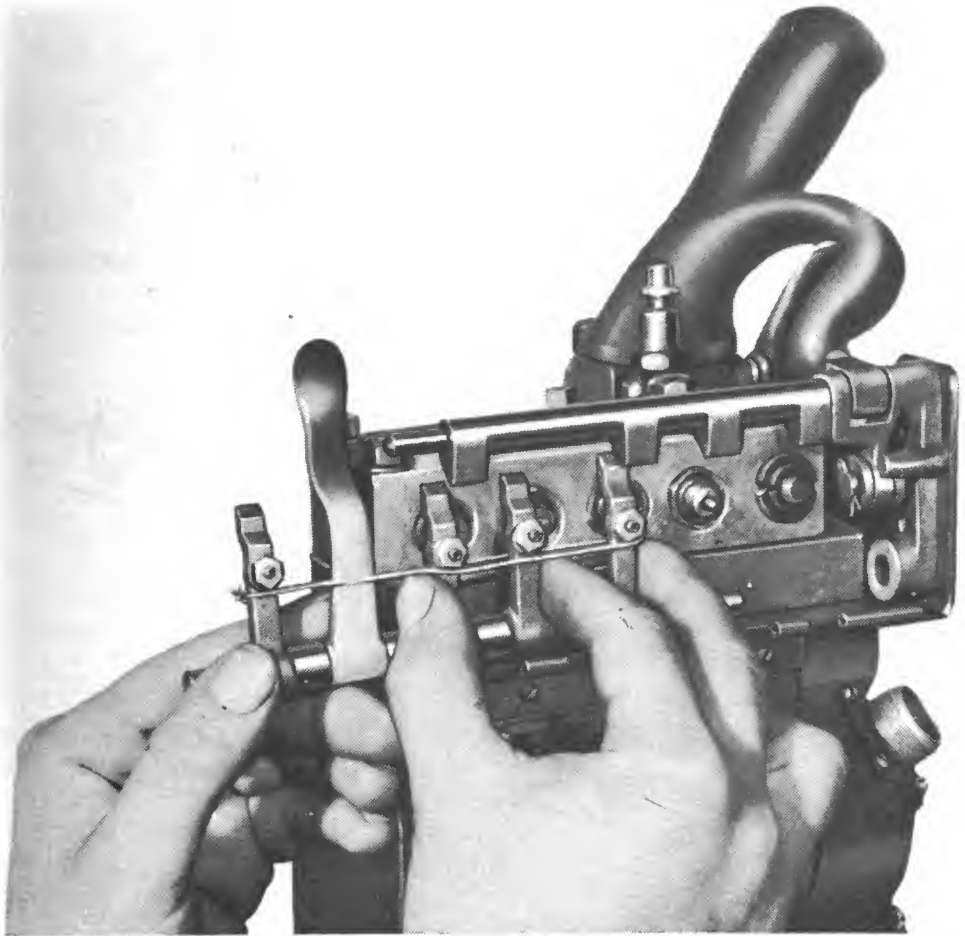


Fig. 105. Removing control levers, spacers, and shaft.

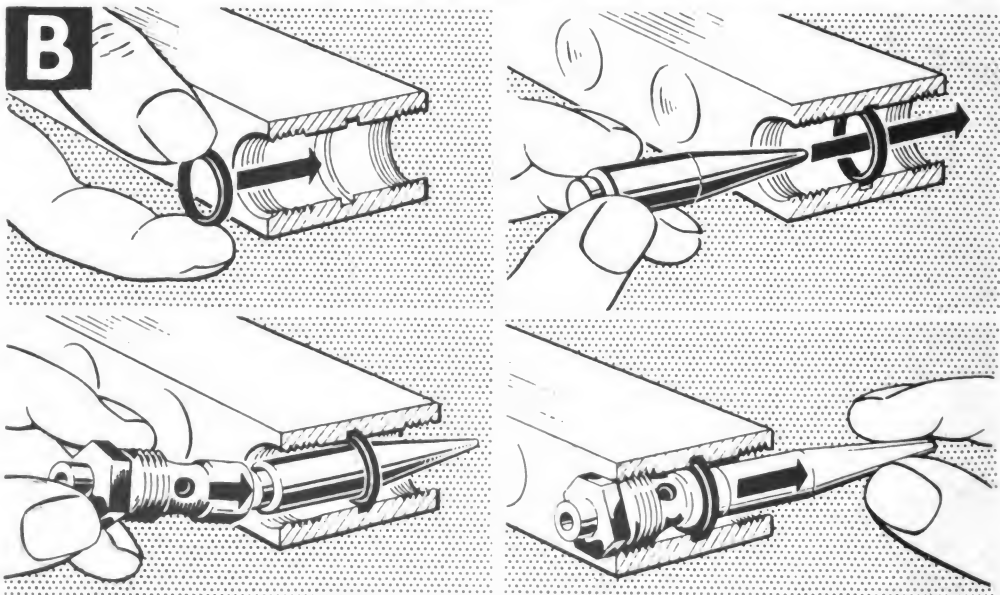
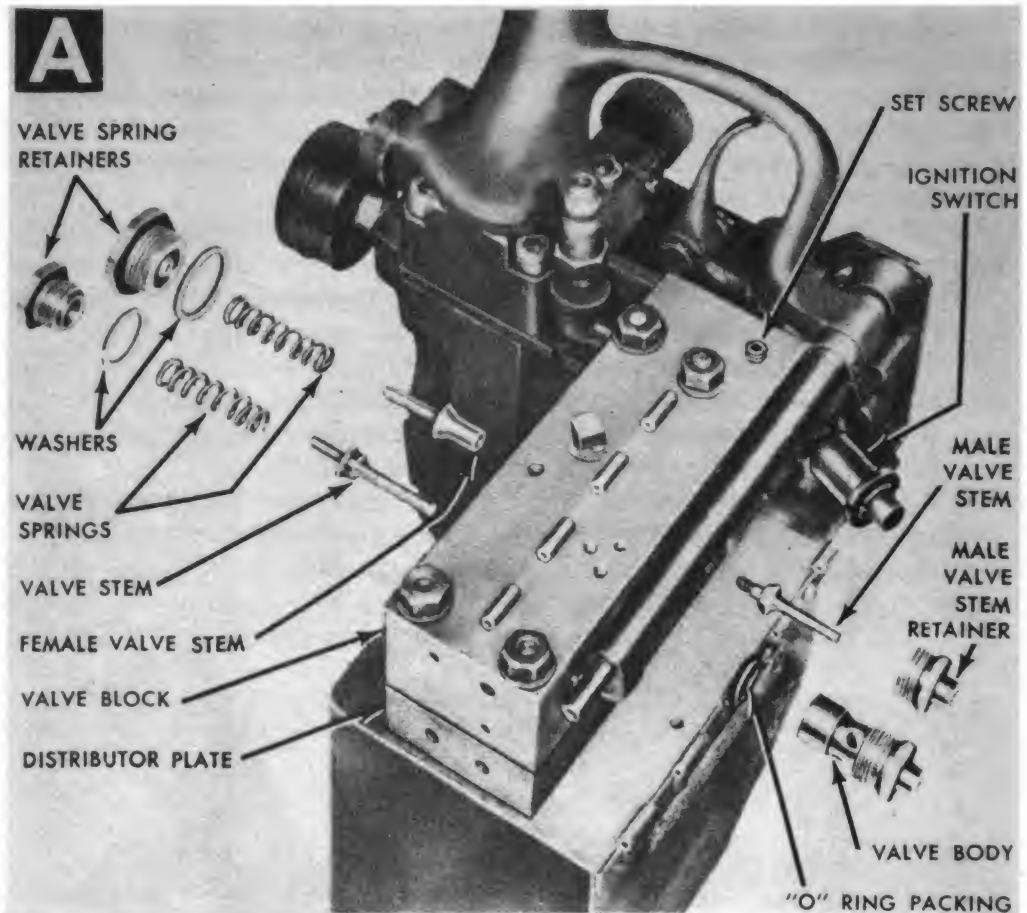


Fig. 106. (A) Exploded view of valve block assembly.  
(B) Inserting O-ring packing.

- (1) Slide control levers, spacers, and shaft into bearing on end plate (plate nearest blow-out lever).
- (2) Slide control levers and trigger mechanism into position so that lugs on shaft are over correct control levers.
- (3) Draw ignition switch wires through distributor plate.
- (4) Replace distributor plate.
- (5) Replace safety plate. It may be necessary to pull on trigger in order to clear the projection on safety plate.
- (6) Replace screws securing safety plate to distributor plate.
- (7) Replace trigger spring.

d. Removal and replacement of ignition switch. (1) To remove switch from valve block assembly:

--Remove control levers and shaft (par. 96e).

--Loosen socket head set screw on bottom of valve block which secures switch to the block (fig. 106 (A)).

--Disconnect the two lead wires on the coil assembly.

--Pull out switch.

(2) To replace switch, reverse procedure for removal.

e. Removal and replacement of atomizer and blow-out valves.

(1) To remove valve assembly:

--Unscrew and remove valve spring retainer, washer, and valve spring on back of valve block of appropriate valve. Use socket head wrench (fig. 107).

--Remove control levers (par. 96e).

--Remove valve body and valve stem with box wrench.

(2) To replace valve, reverse procedure for removal.

f. Removal and replacement of discharge control valve (double valve). (1) To remove valve assembly:

--Remove discharge control valve spring retainer, spring, and washer on back of valve block with socket head wrench (fig. 106 (A)).

--Remove control levers (par. 96e).

--Remove valve packing retainer with box wrench.

--Separate male and female valve stems by unscrewing them.

(2) To replace discharge control valve, reverse procedure for removal.

g. Insertion of O-ring packing (fig. 106 (B)). The O-ring packing in valve block around the single valves is replaced in the following manner:

(1) Remove the valve assembly, into which packing is to be inserted, from the valve block.

(2) With screw driver or piece of wire, remove old O-ring packing from block.

(3) Insert new packing into valve block, manipulating it into recess inside the block.

(4) Lubricate O-packing tool with oil or soap and insert tool into the valve block (fig. 106 (B)).

(5) Place valve body over O-packing tool and push tool through the block.

- (6) Screw valve body into valve housing, keeping O-packing tool in block until valve body is secured. Tighten with wrench.
- (7) Pull out O-packing tool.
- (8) Insert valve stem from the retainer side of the block.

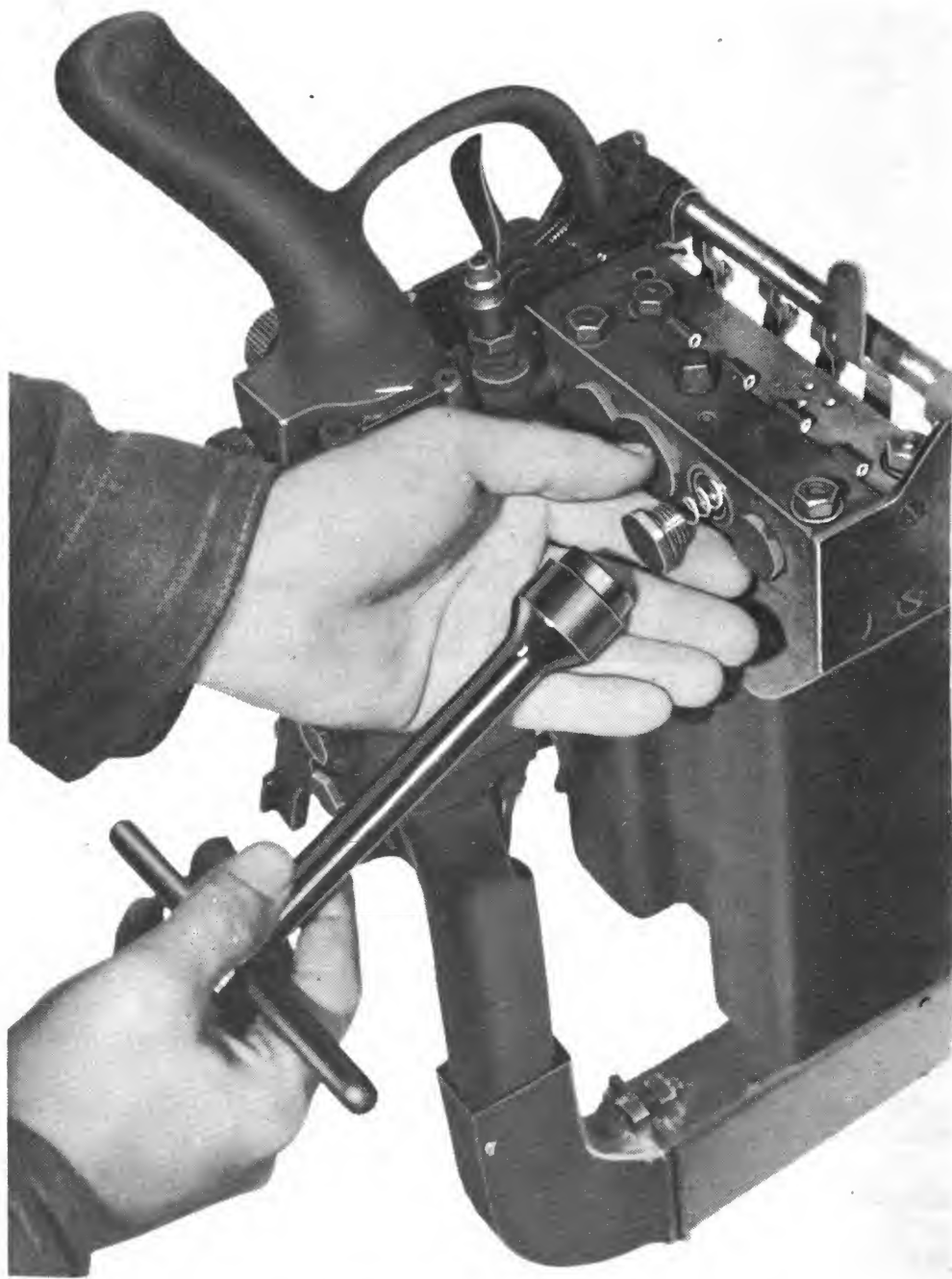


Fig. 107. Removing valve spring retainer.

(9) Replace valve spring, washer, and valve retainer. Tighten with wrench.

#### **96. DISTRIBUTOR PLATE ASSEMBLY.**

a. General. This assembly, on the top of which the gasoline housing assembly is mounted, is a manifold through which the valves in the valve block transmit their action to the flame gun. The plate is composed of three separate brass plates soldered together. Inside the plate are tubes which direct the flow of air and gasoline from the valves. The gasoline, passing through the plate, goes to the atomizer. The air is used in the atomizer, the blow-out operation, and the operation of the discharge valve.

b. Removal and installation. See procedure for removal and installation of valve block (par. 97b, c).

c. Disassembly. No disassembly of the distributor plate is authorized.

## **Section XXIV. EXTERNAL WIRING.**

#### **99. GENERAL.**

a. External wiring connects the flame gun to the 12-volt terminal of the vehicle battery or to the 12-volt switch in the master switch box.

b. The external wiring includes the switch fuse box assembly and the two lead wires. The box contains the toggle switch, one 6-ampere fuse in place in the circuit, and one spare fuse in a holder.

#### **100. REMOVAL.**

a. Disconnect the battery lead cable from the vehicle battery.

b. Unfasten the clips.

c. Remove the bolts or break the weld securing the box to the vehicle.

d. Remove the two screws that secure the box cover.

e. Unplug lead cables from the gun and switch fuse box receptacles by loosening the screws and pulling on the cables.

#### **101. INSTALLATION.**

See paragraph 23a.

#### **102. ADJUSTMENT.**

Check connections and make certain they are secure.



**103. MAINTENANCE.**

Replace blown fuse with spare fuse from holder in switch fuse box. At first opportunity, insert new spare fuse in holder. Check battery and wiring for possible short or improper connection to battery. Repair or replace wiring if necessary

## **Section XXV. GUN FUEL HOSE AND AIR HOSE ASSEMBLIES.**

**104. GUN FUEL HOSE.**

a. General. The hose, air, gun, assembly provides a flexible connection between the air line valve and gun control assembly.

(1) Hose. The hose is made of synthetic rubber and is reinforced with a cover of metal wire and cotton braid. It withstands a pressure of approximately 1,000 pounds per square inch. Its inside diameter is 3/4 inch; its outside diameter is approximately 1-1/4 inches.

(2) Nipples. The hose nipple (tank end) is a female type nipple which connects hose to coupling on fuel outlet piping. The hose nipple (gun end) is a male connection for attachment to the discharge valve body.

b. Removal of gun fuel hose. Remove hose from gun only when necessary for maintenance. To disconnect from fuel group, reverse installation procedure (par. 23e).

c. Installation. (1) To install in fuel outlet piping, see paragraph 23e.

(2) To install in gun, see paragraph 23.

d. Maintenance. If hose nipple (tank end) is badly scored and does not provide tight connection with new coupling washer, replace hose assembly.

**105. AIR HOSE.**

a. General. The hose, air, gun, assembly provides a flexible connection between the air line valve and gun control assembly.

(1) Hose. The hose is made of rubber and is reinforced with braid to withstand relatively high pressures.

(2) Socket. The socket, which connects hose to the plug on air line valve and gun control assembly, is of the slip-on type.

b. Removal and installation. For removal and installation of air hose, see paragraph 23f.

c. Maintenance. Do not attempt to repair hose or its connections. Replace air hose as a unit.

## PART FOUR

### AUXILIARY EQUIPMENT

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#### Section XXVI. GENERAL.

##### 106. SCOPE.

Part four contains information for personnel responsible for the preparation, care, handling, and loading of the ammunition for the weapon. Ammunition for the flame thrower consists of flame thrower fuel, compressed air, and ignition gasoline. Fuel may be considered as the projectile, compressed air as the propelling charge, and the ignition gasoline and ignition spark as the igniter.

#### Section XXVII. FUEL.

##### 107. CHARACTERISTICS OF FUELS.

Thickened fuel gives up to twice the range of liquid fuel. The stream of thickened fuel is comparatively narrow. Most of the thickened fuel clings to and burns in or on a target for as long as 6 minutes. Liquid fuel, on the other hand, is largely consumed in flight to target. While it does not billow around corners as does liquid fuel, thickened fuel strikes target with force enough to ricochet inside. It clings to a surface while burning. The initial flame and smoke are less from thickened fuel than from liquid fuel, but the lower visibility, greater range, and much longer burning period of thickened fuel compensate for its smaller screening effect. Liquid fuels can be poured into fuel containers, but thickened fuels require air pressure in filling operation.

##### 108. PRECAUTIONS WITH FUELS.

a. Flammability. All fuels used in flame throwers are highly flammable. Handle, store, and use with extreme care. Take the same care with diesel oil, fuel oil, and kerosene as with gasoline (motor fuel).

b. Indoor storage. When it becomes necessary to handle gasoline (motor fuel) in a room or building, open windows and doors and take care to see that no unprotected flame which might ignite fumes is in the vicinity. Leave doors and windows open long enough to allow any vaporized gasoline to escape.

c. Flames and sparks. Do not permit presence of open flames,

heated stoves, electrical tools and apparatus, and other equipment likely to cause sparks. Even nails and metal cleats in shoes are a potential hazard in the presence of combustible fumes.

d. Smoking. Post NO SMOKING signs in prominent places about premises and rigidly enforce the rule against smoking.

e. Ventilation and cleaning. Store fuel in buildings which are well-ventilated and thoroughly cleaned every day. Do not permit rubbish or other flammable material in or near such buildings.

f. Spillage. Take care not to spill fuel. If any fuel is spilled, remove promptly.

g. Safety cans. Use safety cans, if possible, for storing small quantities of gasoline. They have self-closing covers that must be forcibly held open to remove or add gasoline.

h. Rags. Provide self-closing metal receptacles with metal lids for discarded, oily, or gasoline soaked rags. Dispose of these rags daily.

i. Electrical apparatus. Use vaporproof incandescent electric lamps, switches, and other appliances of approved type. Do not use open switches, relays, and similar apparatus, or motors with commutators, where gasoline fumes may be encountered.

j. Hose. Inspect flexible metal, rubber, and rubber-metal hose regularly (at least four times a year) and discard when noticeably deteriorated.

k. Toxic fumes. Gasoline fumes are toxic. Do not inhale them.

l. Leaks. Make frequent inspections for leaks, particularly at pipe and hose joints.

m. Fire extinguishers. Provide carbon tetrachloride, carbon dioxide, water fog, or foam type fire extinguishers and locate them where they will be accessible in event of fire. Throw sand, not water, on burning fuel if extinguishers are not available.

n. Leaded gasoline. Gasoline often contains a poisonous lead compound. Do not allow such gasoline, or fuel containing leaded gasoline, to touch the body--especially the lips or eyes, or open cuts or sores.

## 109. TYPES OF GASOLINE USED IN FLAME THROWER.

The term gasoline is used throughout this manual for simplicity. Specific types of gasoline, however, should be used in fuel mixing and in the gasoline reservoir (for ignition purposes) for maximum efficiency of the flame thrower. The following types of gasoline or their equivalents are recommended:

a. Gasoline used in fuel mixing. Use any standard grade of gasoline, motor fuel (all purpose), or aviation gasoline. Gasoline or motor fuel must be free of alcohol, water, and compounds other than lead.

b. Gasoline used for ignition (in gasoline reservoir). Use motor fuel (all purpose) or aviation gasoline with low flash point. Gasoline or motor fuels of high flash point may be used in emergencies when the recommended types are not available. Ignition gasoline must be free of water. Filter gasoline through a chamois when pouring into gasoline reservoir.

**110. PREPARATION AND CARE OF THICKENED FUEL.**

a. Equipment needed. An open end, 55-gallon drum and an improvised wooden mixing paddle are used. Five-gallon cans may be employed to transfer the ingredients. An improvised funnel may be helpful in filling drums with prepared fuel for aging or transporting. Mixing paddle should be approximately 5 feet long, 2 inches wide, and 1 inch thick.

WARNING: Do not use a metal paddle because of danger of spark from drum. Never use galvanized containers for mixing and storing thickened fuels. Such containers may cause fuel to break down and become excessively thin.

b. Ingredients. (1) Thickener. United States Army thickener is supplied in airtight cans containing 5-1/4 pounds, 15-3/4 pounds, or 21 pounds of thickener.

(2) Gasoline and fuel oil. Gasoline is usually used with thickener, but mixture of gasoline and light fuel oil may be used satisfactorily. The light fuel oil can be either No. 1 fuel oil, No. 2 fuel oil, automotive diesel oil, or kerosene. These mixtures give more heat and do not form crusts in the gun. Except in hot climates, 75 percent or more of the mixture by weight or volume should be gasoline. (If too much light fuel oil is included, fuel tends to separate into two layers.) A mixture which has been well-recommended in field reports is 15 gallons of gasoline to 5 gallons of diesel fuel oil (75 percent gasoline and 25 percent fuel oil). Issue gasoline may be used, but locally procured gasoline which contains alcohol is not suitable.

c. Keeping moisture from damaging fuel. (1) Dryness of thickener. Dry thickener is extremely hygroscopic; that is, it absorbs moisture from the atmosphere very rapidly. For this reason, thickener is shipped in hermetically sealed tin cans. Gasoline, or fuel oil and gasoline, should be measured out before thickener container is opened. Powder should be poured immediately into the liquid. Discard and destroy unused powder.

(2) Dryness of containers. Containers used in mixing and handling fuel should be dry.

(3) Removing water from gasoline. The greatest factor contributing to poor fuel mixture is the presence of water in gasoline. The smallest quantity of water in gasoline decreases the consistency of the thickened fuel and causes a variance in fuels from batch to batch. Water has a tendency to enter containers of gasoline even though they are tightly sealed. Always assume that containers of gasoline also contain water. Decant all containers before using the gasoline for fuel mixing by allowing container to stand quietly for 10 minutes and then carefully pouring off gasoline from top, or remove water by the aspirator method illustrated in figure 108.

d. Effect of temperature on mixing. (1) Below 70° F. It is helpful at this temperature to prepare thickened fuel indoors, in a heated room. Temperature of ingredients should be 70° F. or higher. Gasoline may be heated by a steam or hot water coil.

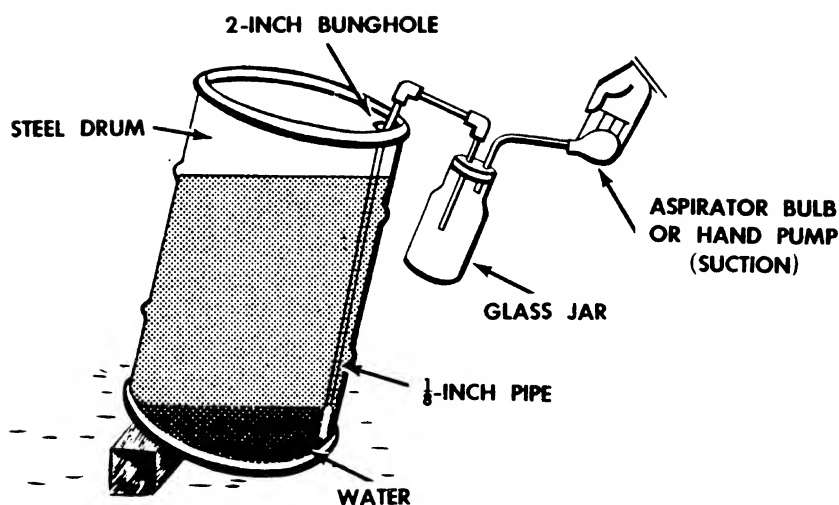


Fig. 108. Aspirator method of removing water from motor fuel or gasoline.

1. After tilting drum, allow to stand several minutes to settle water.
2. Carefully insert aspirator pipe in drum, as shown.
3. Slowly squeeze and release aspirator bulb to draw water in collection jar. Cease operation when gasoline begins to come through.

NOTE: To remove condensate water collected on inside of empty drums, pour a gallon of gasoline in drum and swirl around sides. Follow above operation in removal of water.

(2) Above 90° F. Thickener in this temperature reacts very rapidly. It is easier to prepare batches of 20 gallons each, but any number of batches may be prepared in succession.

e. Proportion of thickener to fuel. A low thickener content gives a thickened fuel many of the characteristics of liquid fuel. One 5-1/4-pound can of thickener to 20 United States gallons of gasoline, or to a gasoline and fuel oil mixture, gives good results. This is equivalent to a 4.2-percent mixture by weight. Except in hot weather, a fuel mixture of less than 3 percent thickener requires such long stirring that its preparation is impractical. Thickener from different lots or manufacturers may cause variations in the consistency of thickened fuel, and a variation of the percentage of thickener may be required to obtain the desired consistency.

f. Mixing of thickener and fuel. Pour 20 gallons of fuel into the open end drum; use a pail or marked paddle as a measure (fig. 109). One man stirs fuel vigorously. Another takes a 5-1/4-pound can of thickener; splits it with a machete, bayonet, or ax; and pours thickener as rapidly as possible into fuel, breaking up by hand any large lumps of dry thickener which may be present. When mixing 40 gallons at a



Fig. 109. Measuring fuel ingredients into mixing drum. (Paddle for measuring and stirring is improvised.)

time, open two 5-1/4-pound cans of thickener and add to fuel in rapid succession. If contents of first can are permitted to gel before adding second can, it is difficult to obtain a uniform mix. Continue stirring until the larger particles of thickener no longer tend to settle to the bottom. Determine this by taking a sample in a clear glass bottle and checking to see if any particles of thickener settle to the bottom.

g. Loading shipping drums. When stirring is completed, immediately transfer fuel to a bucket and pour through a funnel into the shipping drum (fig. 110). The second bung hole should be open, if possible, to provide a vent to aid in pouring. Do not load more than 50 gallons of thickened fuel into a 55-gallon drum. When filling is completed, remove funnel and replace plug. Close the vent opening of the drum.

h. Disposing of unused thickener. Discard any thickener remaining in opened cans. No attempt should be made to save it since moisture in air quickly destroys its properties.

i. Aging and storing. Newly mixed fuel has the appearance of tapioca pudding (fig. 111). Store it overnight before use, if possible. It may be fired, however, within 1 hour after mixing. Store and ship fuel in drums which are clean, moistureproof, dry, strong, and unruined, but not galvanized. Keep them tightly closed and lay them on their sides so that rain water does not collect around bungs.

j. Testing fuel. Before using on missions, test fuels by firing from flame thrower. This is advisable because characteristics of fuel ingredients vary.



Fig. 110. Transferring newly mixed thickened fuel from mixing drum to storage or shipping container for aging.

#### 111. PREPARATION AND CARE OF LIQUID FUELS.

a. Selection of ingredients. Thin fuels are easily ignited, but lack range and are largely burned in flight before reaching target. For this reason, liquid fuels should contain the lowest proportion of gasoline and the highest proportion of heavier fuel that permit easy ignition.



Fig. 111. Contrasting aged thickened fuel, left, with newly mixed fuel, right.



In hot climates, less gasoline is needed than in cold climates. Exactness of proportion, however, is not of great importance. Gasoline used can be any United States grade of motor fuel or aviation gasoline. Suitable fuel blends are as follows:

(1) By volume, 20 to 25 percent gasoline and 75 to 80 percent light fuel oil. The light fuel oil can be either No. 1 fuel oil, No. 2 fuel oil, automotive diesel oil, or kerosene.

(2) One part gasoline to four parts of cleaned crankcase drainings. Unused motor lubricating oil can be employed in place of crankcase drainings, but it is usually unavailable for flame thrower use.

b. Preparation of ingredients. Before preparing blends, take the following steps:

(1) Gasoline, diesel oils, and fuel oils. Allow these fuel materials to stand quietly for at least 10 minutes to permit any water present to settle to the bottom. When transferring fuel to another container, remove the fuel carefully so that no water is remixed with it.

(2) Crankcase drainings. If possible, allow crankcase drainings to stand quietly in a container for at least 1 day. Take care in pouring to prevent transferring sludge which may have settled in the bottom of the container.

c. Equipment needed. Use an open end 55-gallon or 42-gallon drum and an improvised wooden mixing paddle. The paddle should be approximately 5 feet long, 2 inches wide, and 1 inch thick. Do not use a metal paddle because of the danger of striking a spark from the drum. Five-gallon cans may also be used for measuring and transferring ingredients. Have clean, unrusty, steel storage drums ready for use.

d. Stirring of ingredients. Stir all the ingredients in drum with paddle until mixture appears uniform. This should require approximately 2 minutes.

e. Use of crankcase draining blends. If crankcase drainings are used as an ingredient, allow the prepared mixture to settle for 24 hours after stirring, if possible, because the gasoline in the mixture may cause additional sludge to be deposited. Even after this settling period, pour the mixture through cheesecloth or some similar fabric before filling flame thrower. Allow crankcase draining blends to stay in flame thrower only long enough to complete the mission; additional sludge may settle and clog weapon.

f. Transferring mixture. Transfer mixture directly into the flame thrower fuel container or into storage drums.

g. Testing fuel. Before fuel is used on a mission, test it, if possible, by firing from a flame thrower.

h. Storage of fuel. Keep storage drums tightly closed to prevent loss of gasoline through evaporation and to prevent moisture from entering the fuel. If storing in the open, lay drums on their sides so that rain water does not collect around the bungs.

## 112. FILLING FUEL CONTAINER BY BLOWING.

Thickened fuel may be readily forced into fuel containers of flame

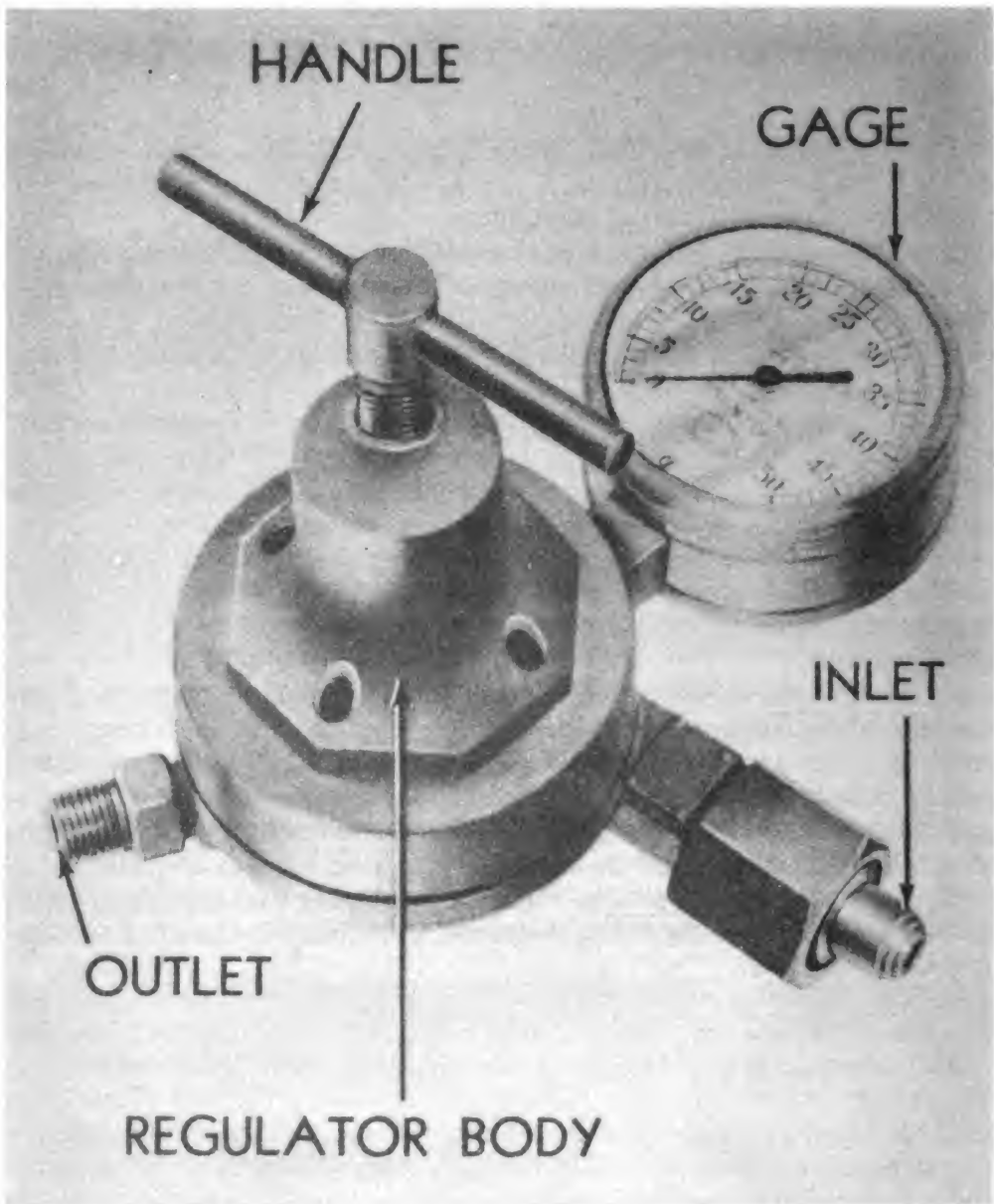


Fig. 112. Pressure regulator from E6 (M10) kit used for fuel filling. throwers by using extremely low pressure of compressed air. Containers may be filled with liquid fuel in the same manner, but it is usually simpler to fill by pouring.

a. Equipment and personnel required. (1) Personnel. Three men are required for filling by blowing.

(2) Kit. Use flame thrower fuel filling kit E6 (M10) or equivalent.

(3) Cylinders. When pressure in cylinders of compressed air has fallen too low to be of further use in charging pressure containers of flame throwers, use remaining pressure to blow fuel into fuel containers.

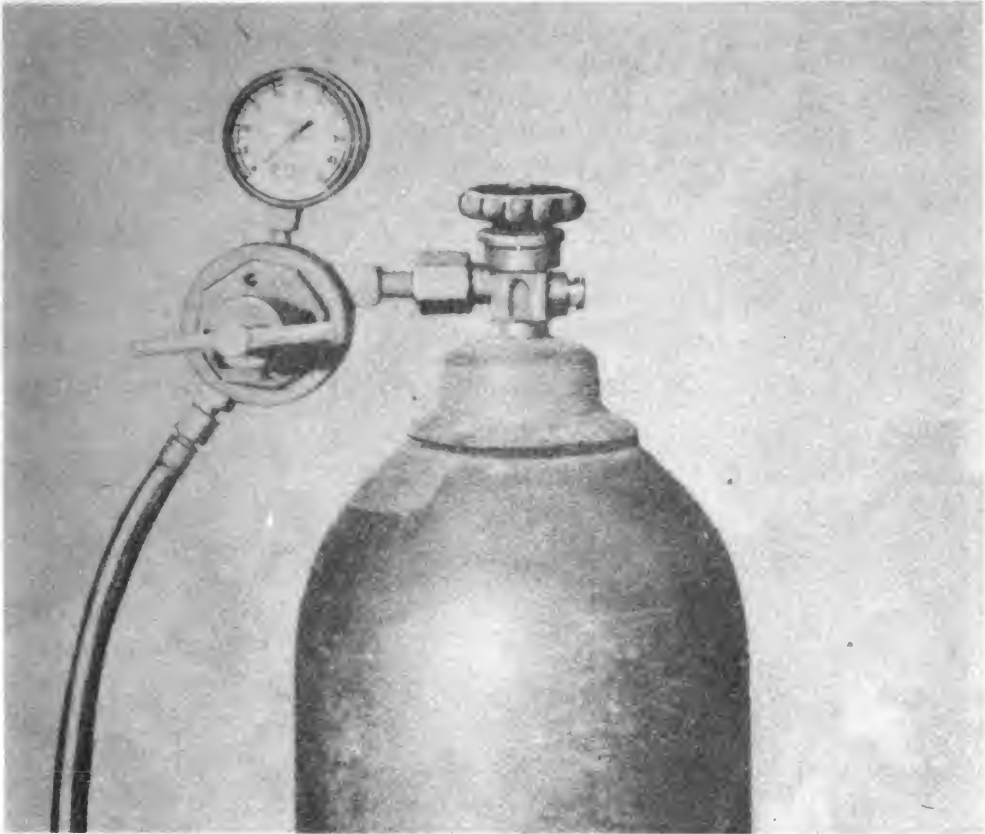


Fig. 113. Pressure hose and pressure regulator connected to cylinder.

(4) Compressor or pump. Use an air compressor or a hand air pump (tire pump) in place of a cylinder, if a cylinder is not available. Not more than 15 to 20 pounds pressure per square inch is permissible on fuel drums.

(5) Regulator. Only diaphragm type pressure regulator (fig. 112) or regulator valve can be used safely. This regulator must be capable of regulating any pressure that may be applied to it.

CAUTION: Do not attempt to apply pressure directly from the cylinder to the storage drum. Any attempt to control the pressure by opening the cylinder valve slightly (cracking the valve) is almost certain to result in explosive pressure being applied to the drum.

(6) Drums. Use clean, noncorroded, steel, 55-gallon drums (fig. 110). Drums of United States manufacture which meet requirements are stamped ICC-5 or ICC-5A, followed by three numbers in sequence; for example: 14-55-44. The number 14 indicates gage of metal, 55 indicates capacity in gallons, and 44 indicates year of manufacture. A steel drum of 14-gage or heavier is preferable, but light drums (of 16- or 18-gage) may be used. Drums made of gages lighter than 18-gage

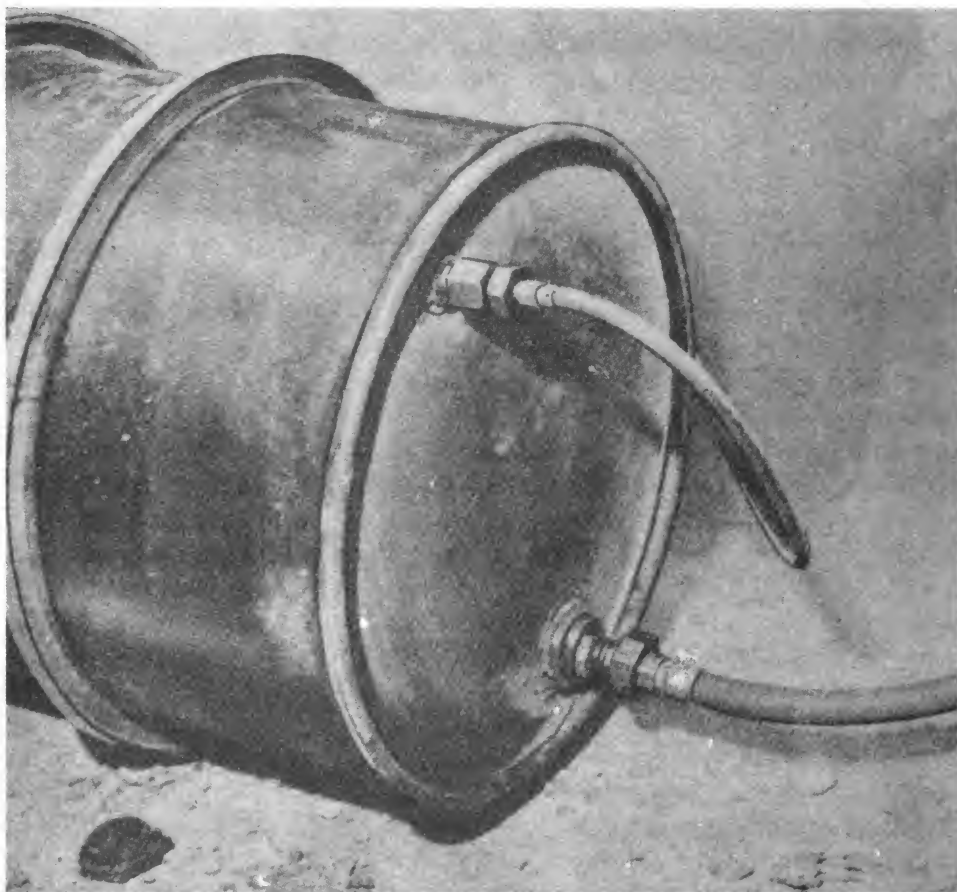


Fig. 114. Drum fitted with adapters connected to the pressure hose and the fuel filling line.

(20- or 22-gage) must not be used. Never move drums while under pressure.

b. Procedure. (1) Connect source of pressure, drum of fuel, fuel filling line, pressure hose, and other parts as shown in figures 113 and 114. Use threaded adapters, as necessary, to fit lines to the drum. Make all threaded connections tight by use of wrenches on joints. Lay drum on its side on ground or platform. Stand pressure cylinder upright. Place drum so that opening to which fuel filling hose is connected is close to ground or platform.

(2) Place gate valve end of fuel filling hose in assistant driver's door.

(3) Connect end of fuel filling hose to coupling at end of fuel outlet piping (fig. 115).

(4) Close blow-off valve.

(5) Disconnect bleed hose from blow-off valve and lay end on top of vehicle through assistant driver's door. Be sure other end of bleed hose remains connected to the bleed valve.

(6) Station one man in assistant driver's seat, one man at pressure

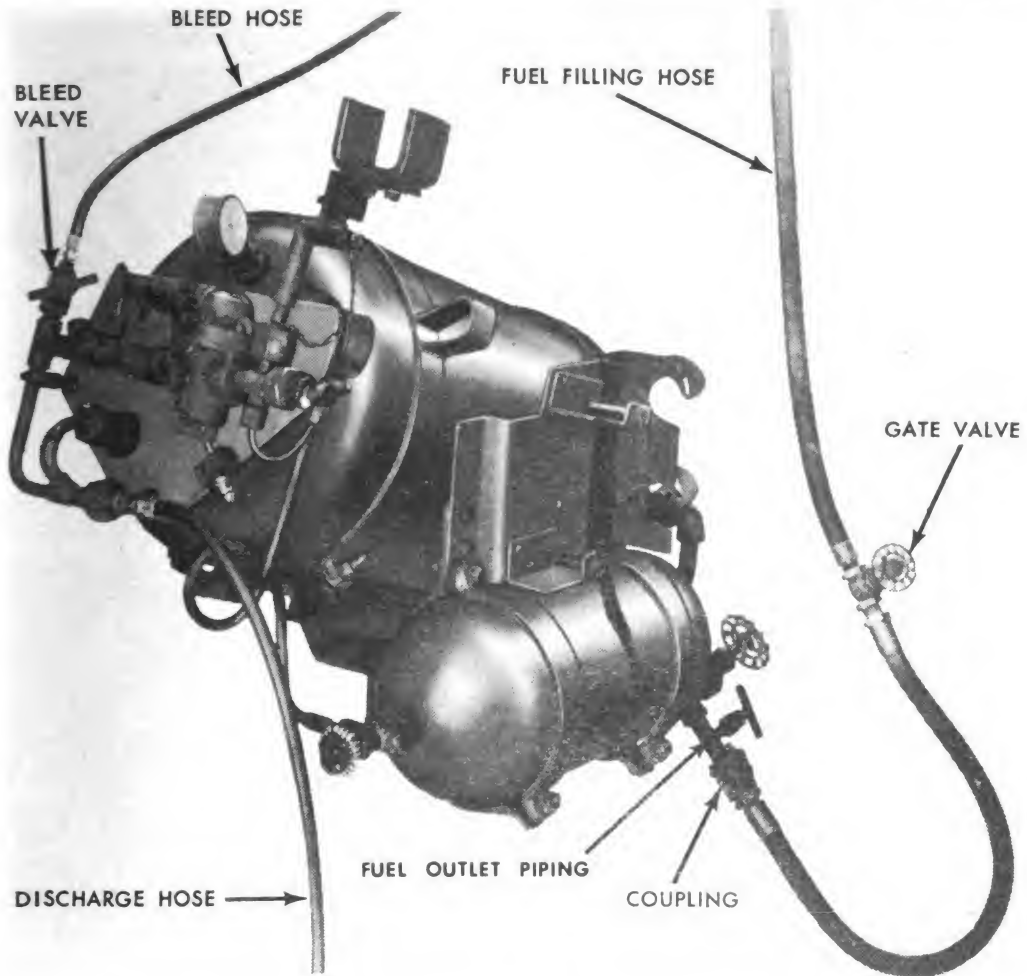


Fig. 115. Fuel filling line connected to transmission fuel group. This set-up is the same for the sponson fuel group.

cylinder, and third man on vehicle holding end of bleed hose and pointing it away from vehicle and personnel (fig. 116).

- (7) Open fuel container valve.
- (8) Open bleed valve halfway to allow escape of air from fuel container as container fills.
- (9) Open gage valve at end of filling hose adjacent to flame thrower.
- (10) Open pressure cylinder valve. If air compressor is used, start compressor; if tire pump is used, start to pump.
- (11) Open pressure regulator of filling line slowly by turning regulator handle clockwise, watching gage on regulator to be sure pressure to drum does not exceed 15 to 20 pounds.
- (12) Closely watch end of bleed hose which is outside vehicle. As soon as fuel spurts from hose, quickly close gate valve on end of fuel filling hose.
- (13) Close bleed valve.
- (14) Close fuel container valve.





Fig. 116. Filling fuel container by blowing.

(15) Close valve on cylinder of compressed air. Discontinue using compressor or pump.

(16) Disconnect fuel filling hose from coupling on fuel outlet piping, using cotton waste at coupling to catch spillage. Remove fuel overflow from hull with cotton waste.

(17) Bring free end of the bleed hose into vehicle. Screw free end to blow-off valve.

(18) If no additional flame throwers are to be filled, use wrench to loosen air line at drum slightly, allowing pressure to bleed. When pres-

sure in drum has fallen to that of the atmosphere, close pressure regulator by turning handle counterclockwise.

### 113. FILLING FUEL CONTAINER BY GRAVITY.

a. General. The gravity method of filling may be used with liquid fuels.

b. Procedure. Proceed as follows:

(1) Place drum of fuel (or 5-gallon cans of fuel) on top of vehicle or on platform higher than vehicle.

(2) If drum cannot be connected directly to fuel filling hose, connect 12-inch funnel to hose end to prevent spillage. Connect other end of filling hose, or series of coupled hose, to fuel outlet coupling of flame thrower fuel container in vehicle. A gate valve must be included in hose line adjacent to a short hose coupled to fuel container. Some drums have threads which require adapters. Adapters are included in fuel filling kit and may be screwed into drum openings as needed.

(3) Open bleed valve halfway. This permits air in fuel container to be displaced when fuel pours in.

(4) Unscrew bleed hose at blow-off valve. Close blow-off valve. Place free end of bleed hose outside vehicle through door and point it away from vehicle.

(5) Open fuel container valve.

(6) Open gate valve in filling line.

(7) If drum is used, turn it on its side with outlet at bottom so fuel can flow through gate valve and through hose into fuel container. Unscrew upper bung to provide air vent.

(8) When fuel starts to overflow from bleed hose, immediately close fuel container valve.

(9) Close bleed valve.

(10) Close gate valve in fuel filling line.

(11) Carefully disconnect fuel filling hose, to minimize spillage of fuel remaining in line. Use cotton waste under coupling to absorb any fuel that may be spilled

(12) With cotton waste or similar absorbent material, remove any spilled fuel remaining on hull.

(13) Screw free end of bleed hose into its normal position at blow-off valve. Tighten with wrench.

(14) Remove fuel filling line, drum, and 5-gallon cans from vehicle.

### 114. FILLING GASOLINE RESERVOIR.

Before each mission, refill gasoline reservoir in gun. To fill:

a. Unscrew plug with wrench.

b. Place small funnel in plug hole.

c. Insert piece of clean chamois in funnel to act as filter for gasoline.

d. Using bottle or other convenient small container, pour clean liquid gasoline onto the chamois and allow it to filter into gasoline reservoir. Motor fuel or any other good grade of gasoline may be used.



e. Close reservoir by screwing plug back into position and tightening with wrench.

CAUTION: Ground the funnel when filling reservoir. Always keep same side of chamois up when pouring gasoline through chamois.

## Section XXVIII. PRESSURE.

### 115. GENERAL.

Pressure container must be charged before the vehicle starts on a mission involving use of the flame thrower. After charging pressure container, and before operating the flame thrower, high pressure line gage on pressure line plate should register approximately 1,800 pounds per square inch if full range of flame thrower is to be achieved. Do not use nitrogen to charge pressure containers when E6R3 gun is used.

### 116. PRECAUTIONS WHEN PRESSURE CHARGING.

Observe the following precautions when pressure charging:

a. Handling. Handle all cylinders and flame throwers carefully; never drop them or subject them to shock or blows. Keep valve protection caps secure when cylinders are being handled, except when such handling is incident to use of compressed air.

b. Storage. Keep all cylinders and charged flame throwers or tank groups in either open or closed storage. Protect them from dampness and excessive rise in temperature caused by direct rays of sun or other source of heat. Avoid storing them near highly flammable substances, or in places where they may be struck by moving objects. Segregate empty cylinders to avoid confusion.

c. Compressed gases. Do not attempt to use compressed gases unless trained in this work. Use gases only for purposes for which they are intended.

d. Safety devices. Do not tamper with safety devices in cylinder valves. If available, use proper replacement parts for safety devices in need of repairs. Do not attempt to use makeshift or nonstandard parts.

e. Opening of valves. Open valves slowly each time compressed air is transferred from a cylinder. When a wrench is used, be sure it fits properly and is kept ready for instant use while the compressed air is being released.

f. Threads. See that threads match before making connections.

g. Correct equipment. Use gages, regulators, hose, pipe, and tubing of the type manufactured or specified for the particular apparatus or for use with compressed air.

h. Repair. Never attempt to alter or repair a cylinder.

i. Flames and sparks. Do not permit flames, sparks, or ignition

from the flame thrower or other source to touch the hose.

j. Dust in valves. Immediately before coupling an attachment to the pressure tank or cylinder valve, open valve for an instant to blow out any dust or dirt. Never stand where air or dirt may be blown into the eyes or face. If the valve is difficult to open, apply more force gradually.

k. Special devices. Do not attempt to use any special connections or equipment without the approval of a qualified expert.

l. Keeping valves closed. Keep the valve of each cylinder closed when its contents are not actually being released from or admitted to the cylinder. This applies to all cylinders, whether they contain a compressed gas or are empty.

### **117. CHARGING FROM AIR COMPRESSORS.**

Compressors provide the quickest and most efficient method of charging pressure containers, but they may not always be available. The 7CFM gasoline engine driven air compressor M1 is a self-contained, skid mounted compressor, manufactured specially for charging pressure containers of flame throwers. It also may be used to recharge 200- or 220-cubic foot, commercial type cylinders, which in turn can be transported to the flame thrower charging point. Use of this compressor is explained in detail in TM 3-377. The service unit, mechanized flame thrower, E8R1 may be used also to charge the pressure container. Use of this service unit is explained in detail in TM 3-361.

### **118. TESTING COMPRESSED AIR CYLINDERS.**

If air compressor is not available, use commercial type cylinders containing compressed air.

a. Authorized gases for use in M3-4-E6R3 flame thrower. Use only compressed air to charge pressure containers of mechanized flame thrower.

b. Warning against use of oxygen. Oxygen is sometimes shipped in cylinders having same threads as other gas cylinders. Before using a cylinder, test to be sure that it does not contain straight oxygen, as the introduction of oxygen from a cylinder into a fuel container of the mechanized flame thrower may cause a violent explosion.

c. Testing procedure. To test for oxygen, introduce flaming splint into a jet of released gas. If cylinder contains oxygen, flame from splint flares up. Test as follows:

- (1) Fasten a splint of wood to a wire at least 1 foot long.
- (2) Ignite splint.
- (3) Stand aside and hold splint before cylinder outlet.
- (4) Crack valve slightly to permit small stream of gas to escape.

If flame from splint flares up, gas MUST NOT be used.

### **119. CHARGING FROM CYLINDERS USING E9 SERVICE KIT.**

a. Equipment required. (1) One manifold block and three or four manifold leads (fig. 117). These parts must be clean and free from oil or grease.

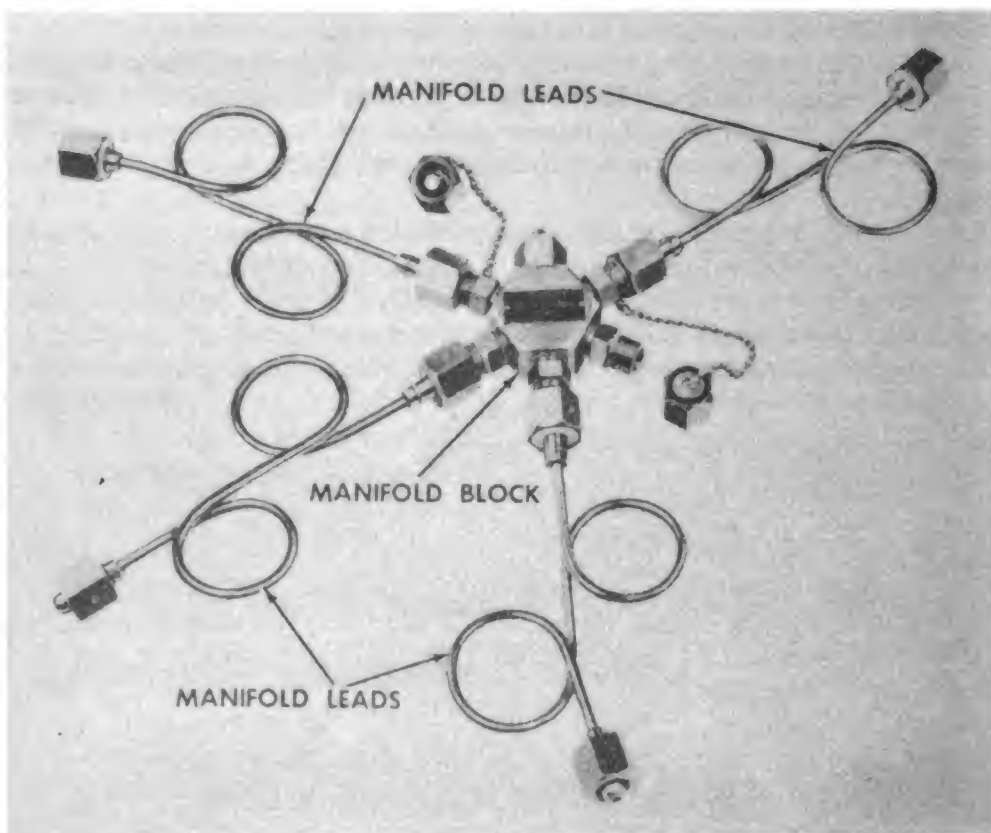


Fig. 117. Pressure filling line assembly (manifold)  
from E9 service kit.

(2) Pressure cylinder charging line assembly. Assembly must be clean and free from oil or grease.

(3) One charging line hose.

(4) One manifold wrench (from service kit).

(5) Four or five commercial cylinders. One cylinder must have a pressure of from 2,100 to 2,200 pounds per square inch. One cylinder may have as low a pressure as 600 pounds per square inch. Pressure in the other cylinders may vary between pressures of the low and high pressure cylinders. Best results are obtained in using six or more fully charged cylinders. Each cylinder used should have a 220-cubic foot capacity.

b. Assembling apparatus. (1) Test all pressure cylinders to be sure they do not contain oxygen.

(2) Stand four or five pressure cylinders together on level ground adjacent to assistant driver's door. Remove dust caps from cylinders.

(3) Connect the inlet nut on the manifold block to one of the cylinders and tighten the connection with a wrench. Keep the manifold block horizontal.

(4) Couple manifold leads to threaded fittings of manifold block. Tighten with wrench. (Use two leads if charging from three cylinders,

three leads if charging from four cylinders, or four leads if charging from five cylinders.)

(5) Crack the valve of the cylinder connected directly to the inlet nut to clear the manifold of dust or dirt. Close cylinder valve.

(6) Connect other end of the manifold leads to outlets of cylinders. The leads may be bent to permit fittings to screw over cylinder outlets. Be careful to align threads so that they are not damaged. Tighten with end wrench.

(7) Screw gland nut (located on end of the pressure charging hose) to manifold block at one of the threaded outlets.

(8) Screw charging line hose to pressure charging line assembly.

(9) Screw dust cap (chained to manifold block) tight with a wrench on any open manifold block connection which is not being used.

c. Charging procedure. (1) Unscrew cap of pressure charging valve and screw spindle end of pressure charging line in position (fig. 118). Use wrench to make line tight. Close spindle tightly by turning it clockwise.

(2) Close pressure cut-off valve tightly by turning it clockwise.

(3) Open pressure container valve.

(4) Open valve on pressure cylinder marked as having lowest pressure content.

(5) Man in assistant driver's seat observes high pressure line gage on fuel group being charged. When gage shows no further increase, pressure in container and cylinder are equal.

(6) Close valve on pressure cylinder which now has pressure equalized with pressure in pressure container.

(7) Check high pressure line gage and mark the reading on the used pressure cylinder. Use chalk, crayon, or pencil.

(8) Open valve on pressure cylinder marked with next higher pressure. Repeat steps (5) through (7) above.

(9) In the same manner, use third and fourth pressure cylinders, discontinuing charging only when the high pressure line gage indicates pressure of approximately 1,800 pounds per square inch.

(10) If third and fourth cylinders on manifold do not raise pressure in container to approximately 1,800 pounds:

--Close pressure container valve.

--Turn spindle of charging line slowly, to allow bleeding of pressure from charging line and manifold. Keep face and eyes away from spindle. Close spindle tight when all pressure is bled from lines and manifold.

--Remove from manifold lead the cylinder having lowest pressure.

--Replace removed cylinder with fully charged cylinder.

--Open pressure container valve.

--Repeat steps (6) through (9) above until high pressure line gage indicates approximately 1,800 pounds.

(11) Close pressure container valve.

(12) Turn spindle of charging line slowly to allow bleeding of pres-

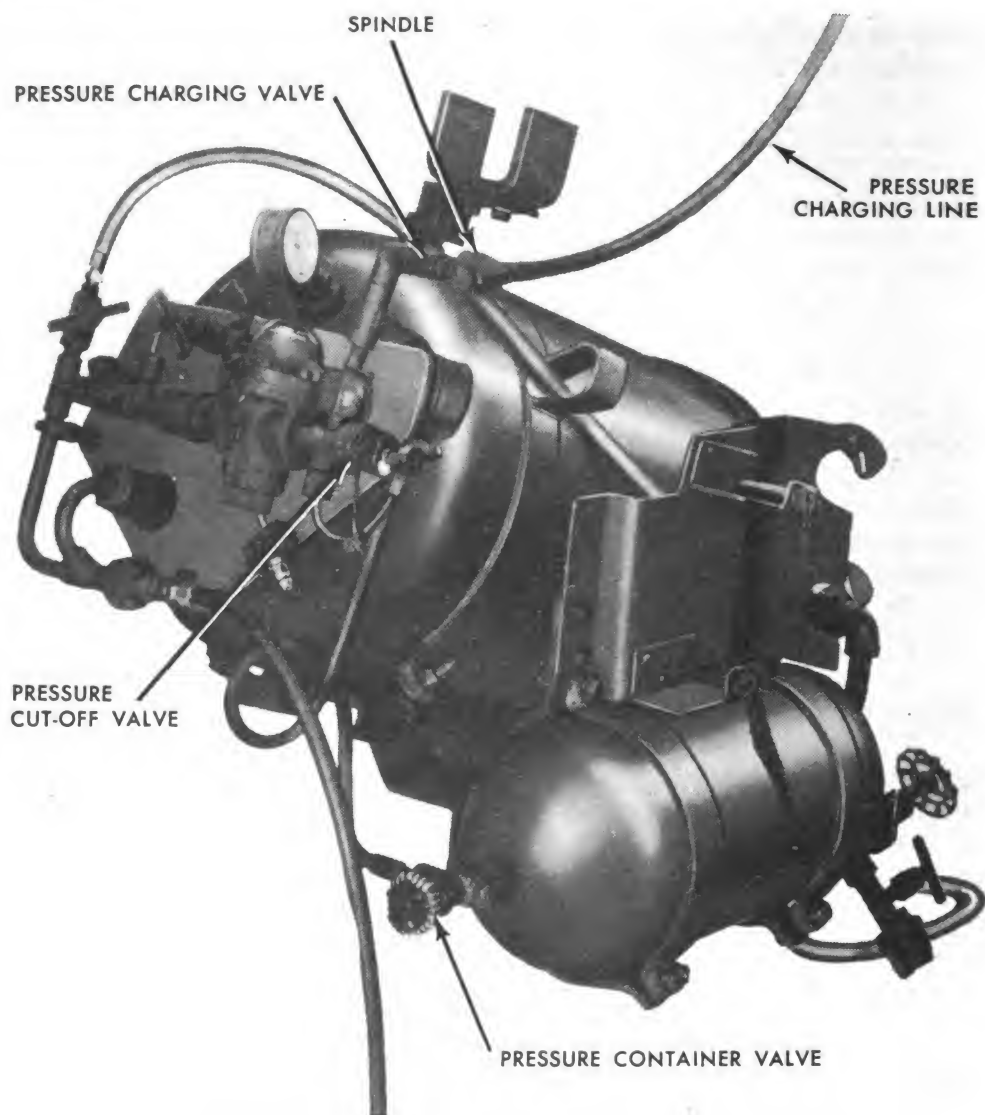


Fig. 118. Pressure charging line connected to transmission fuel group. Same procedure is used for sponson fuel group.

sure from pressure charging line and manifold. Keep face and eyes away from spindle.

(13) Unscrew charging line from pressure charging valve with a wrench.

(14) Screw cap tightly on pressure charging valve with a wrench.  
d. Disassembling apparatus. If it is desired to disassemble charging apparatus:

- (1) Unscrew charging line from manifold block.
- (2) Unscrew tubing extensions of manifold from pressure cylinders.
- (3) Place dust caps on all cylinders.
- (4) Send cylinders now marked with pressure under 600 pounds

to rear echelon for recharging or replacement. One such cylinder may be retained, however, for use in filling of fuel by blowing.

(5) If it is believed that flame thrower fuel, gasoline (or other solvent), grease, or oil has collected in a pressure container, pressure cylinder, pressure cylinder valve, charging line, or other high pressure part, it should be so marked and returned at once to rear echelon for cleaning as described in TB CW 20. (Technical Bulletins are to be superseded by appropriate War Department Technical Manuals or changes to manuals.)

#### **120. CHARGING FROM CYLINDERS USING SERVICE KITS FOR M2-2 PORTABLE FLAME THROWERS.**

If M3 service kit is not available, pressure charging equipment from service kits for M2-2 portable flame throwers may be used. Equipment from one service kit may be used, but if equipment from two kits is combined (fig. 119), compressed air is conserved. General procedure for charging pressure containers of mechanized flame throwers is same as that in paragraph 119. For additional information, see TM 3-376A or Army Service Forces Catalog CW 6-445115 or CW 9-445115.

#### **121. PRESSURE CHARGING USING ONE CYLINDER AT A TIME.**

If all equipment described in paragraphs 119 and 120 is not available, it is possible to charge pressure containers by connecting one cylinder at a time to pressure container by means of pressure cylinder charging line assembly. Cylinders with lowest pressure content are used

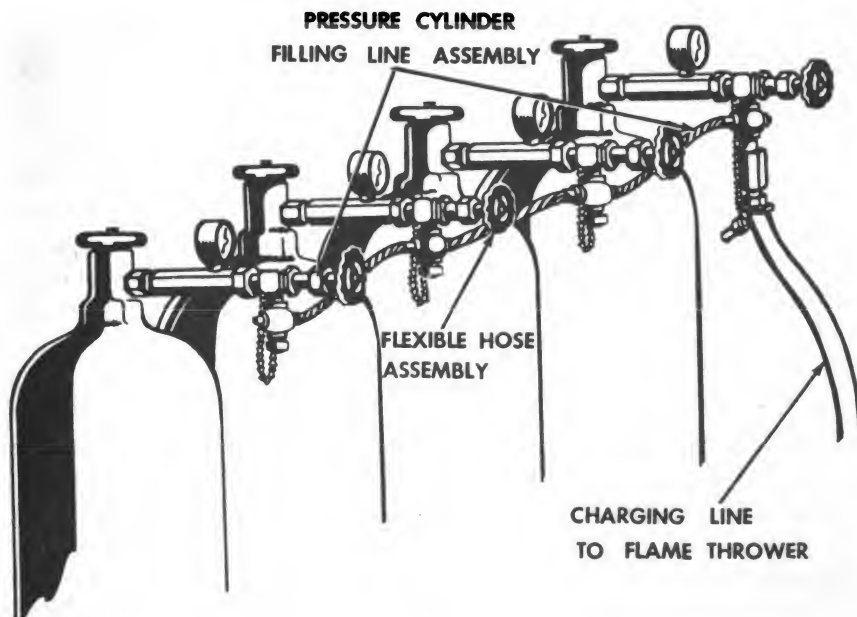


Fig. 119. Using equipment from two service kits for portable flame throwers M2-2 to charge pressure container.

first, followed by those with successively higher pressure contents, until approximately 1,800 pounds pressure is shown in pressure container on high pressure line gage. Care must be taken to prevent entrance of dirt or other foreign matter into cylinder valves or other parts. Before disconnecting each cylinder, be sure to close pressure container and cylinder valves and to bleed pressure line at spindle.



# APPENDIX

## Section I. SHIPMENT AND STORAGE.

### 1. GENERAL.

Preparation for domestic shipment of the mechanized flame thrower is the same as preparation for limited storage.

### 2. PRECAUTIONS.

Prior to storing the flame thrower, check to be sure that:

- a. Fuel containers are completely empty of fuel.
- b. Gasoline reservoir is completely empty of gasoline.
- c. Pressure containers and pressure lines are bled of compressed air.
- d. Dome of pressure regulators are bled of compressed air.

### 3. LUBRICATION.

Lubrication of the mechanized flame thrower will be performed in accordance with lubrication instructions prescribed in section XIII.

### 4. CLEANING.

- a. Clean materiel thoroughly, using dry cleaning solvent or a soda ash or soap solution.
- b. Apply dry cleaning solvent or diesel fuel oil by scrubbing with a brush or wiping with a clean cloth.
- c. Apply a warm soda ash solution by vigorously brushing or thoroughly scrubbing the surfaces until all traces of contamination are removed. Rinse surfaces with clean, warm water and dry thoroughly. Soda ash solution consists of 1/2 pound of soda ash dissolved in 2 gallons of warm water.
- d. Avoid touching cleaned surfaces with bare hands.

### 5. PAINTING.

Remove rust spots and repaint surfaces that have become checked, pitted, or rusted.

- a. Removing rust spots. The following methods may be used in removing rust spots:

- (1) Use aluminum oxide abrasive cloth for cleaning finished or unfinished external surfaces where wear of the parts cleaned will not affect the functioning of the mechanism.

- (2) Use crocus cloth for removing rust or stain.

- b. Application of rust inhibitive synthetic primer. Apply a liberal

coating of rust inhibitive synthetic primer over the entire area of the cleaned surface to be repainted. Use the primer on bare metal as a base coat for synthetic enamel. Apply either by brushing or spraying. The primer brushes satisfactorily as received or after the addition of not more than 5 percent by volume of volatile mineral spirits paint thinner. For spraying, thin the primer with not more than 15 percent by volume of volatile mineral spirits paint thinner. Allow to dry thoroughly.

c. Sandpapering surfaces. Sandpaper primed surfaces with No. 2/0-100 flint paper and wipe all particles of dust from surfaces.

d. Application of enamel. Apply a coat of lusterless, olive drab, synthetic enamel to the following parts and allow enamel to dry thoroughly before materiel is used.

(1) Fuel and pressure units, except bleed hose, discharge hose, and faces of high and low pressure gages.

(2) Gun, except gun hose and external wiring of gun.

## 6. APPLICATION OF PRESERVATIVE.

Apply preservative immediately after cleaning and drying. Rust-preventive compounds used will be brought to the proper consistency by heating before application.

## 7. PACKING FLAME THROWER FOR STORAGE.

a. Sponson fuel group. The unit is shipped in a nailed wooden packing box. The lid is secured with nails and metal strapping. Four bolts and four nuts hold the fuel group to the bottom of the box. Included in the packing box are the gun box, organizational spare parts container, and pressure container relocating equipment container.

b. Transmission fuel group. This unit is shipped in a nailed wooden packing box. The lid is secured to the box by nails and metal strapping. The transmission fuel group is bolted to the bottom and one end of the packing box.

## 8. SHIPPING DATA.

All data are approximate.

### a. Sponson fuel group packing box.

Length . . . . .	46 inches
Width . . . . .	34 inches
Height . . . . .	34 inches
Cubage . . . . .	30.8 cubic feet

### b. Transmission fuel group packing box.

Length . . . . .	46 inches
Width . . . . .	34 inches
Height . . . . .	34 inches
Cubage . . . . .	30.8 cubic feet
Shipping weight . . . . .	670 pounds

## Section II. REFERENCES.

### 9. REFERENCES.

References pertaining to the use and care of flame throwers include:

#### a. Army Regulations.

- AR 850-20      Precautions in Handling Gasoline
- AR 850-60      Compressed Gas Cylinders; Safe Handling, Storing, Shipping, Using

#### b. Field Manuals.

- FM 21-6      List of Publications for Training
- FM 100-5      Operations

#### c. Technical Manuals.

- TM 3-220      Decontamination
- \*TM 3-361      Service Unit, Mechanized Flame Thrower, E8R1
- TM 3-376A      Portable Flame Thrower M2-2
- TM 3-377      Compressor, Air, Gasoline Engine-Driven, 7CFM, M1
- TM 9-850      Cleaning, Preserving, Sealing, Lubricating, and Related Materials Issued for Ordnance Materiel

#### d. Technical Bulletins.

- ‡TB CW 18      Kit, Fuel Filling, Flame Thrower, E6
- ‡TB CW 20      Cleaning Interiors of Compressed Gas Cylinders, Tanks and Accessories
- ‡TB ENG 39      Safe Handling of Compressed Gases

#### e. Army Service Forces Catalogs.

- CW 6-445115      Army Service Forces Catalog: Kit, Service, for Portable Flame Thrower, M2-2 (Sets of Tools, Equipment, and Similar Material)
- CW 9-445115      Army Service Forces Catalog: Kit, Service, for Portable Flame Thrower, M2-2 (List of All Parts and Higher Echelon Spare Parts)
- \*CW 7-440321      Army Service Forces Catalog: Flame Thrower, Mechanized, M3-4-E6R3 (Organizational Spare Parts and Equipment: 1st and 2nd Echelons)
- \*CW 6-445302      Army Service Forces Catalog: Kit, Service, Mechanized Flame Thrower, M3 (Sets of Tools, Equipment, and Similar Material)

\*Proposed publication.

‡Technical Bulletins are to be superseded by appropriate War Department Technical Manuals or changes to manuals.

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